AMERICAN ARTISAN

ARM AIR HEATING • SHEET METAL
ONTRACTING • AIR CONDITIONING

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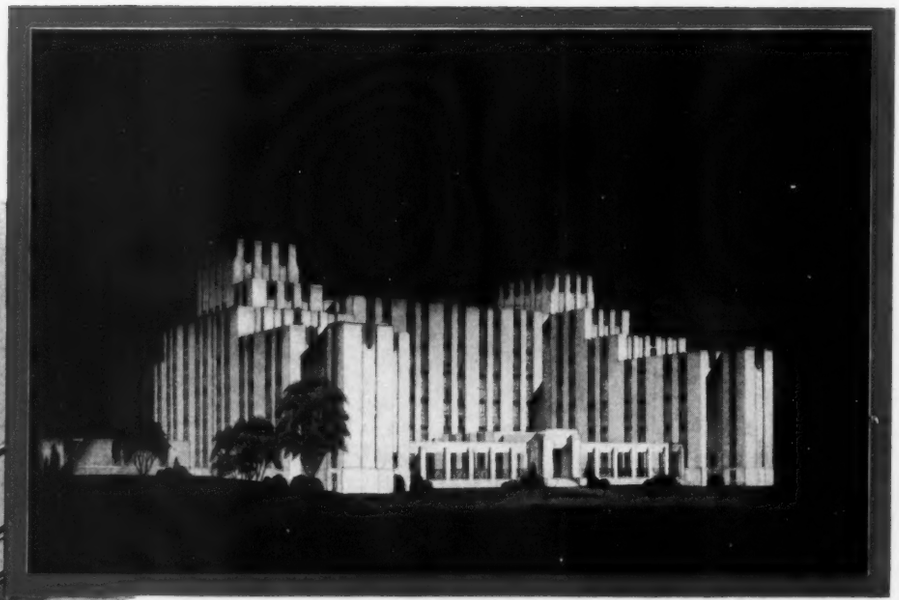
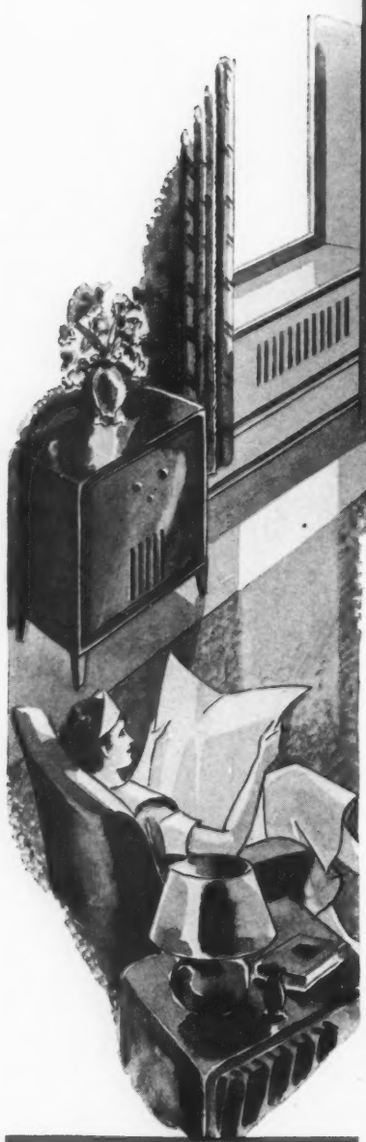
TONCAN IRON . . .

FIRST AID TO *PERMANENCY*



THE NEW NURSES' HOME, BALTIMORE CITY HOSPITAL, BALTIMORE, MD.
Architects: Palmer & Lamdin. Consulting Engineers: Reeder, Eiser & Akers. More than 11,000 lbs. of Toncan Iron installed in ventilating ducts by Lloyd E. Mitchell, Inc.



MASTER builders of hospitals must carefully weigh the lasting qualities of all materials entering into their construction. Repairs and replacements, always an expensive nuisance, must be avoided by the thoughtful selection of long-lasting materials.

With these facts in mind, Toncan Iron was chosen for all the ducts of the ventilating system of the New Nurses' Home, Baltimore City Hospital. This modern metal, hidden behind the plaster in walls and ceilings, will continue for years to bring health and comfort to occupants of this beautiful structure.

There are many reasons why Toncan Iron should be used wherever sheet metal will serve. Being a modern alloy—of refined iron, copper and molybdenum—it is in a class by itself from the standpoint of corrosion, ranking first in rust resistance among the ferrous metals after the stainless alloys. This means that it gives more years of service. Being ductile, it works easily—forms, draws and welds without difficulty. This means quicker fabrication at lower cost. It is sponsored by the world's largest producer of alloy steels. Its record of service extending over twenty-five years is Toncan Iron's most forceful argument in asking your consideration.

This record is contained in an interesting book, "The Path to Permanence." Let us send you a copy.

REG. U.S. PAT. OFF.
TONCAN
COPPER
MO-LYB-DEN-UM
IRON

REPUBLIC STEEL CORPORATION
GENERAL OFFICES YOUNGSTOWN, OHIO

Covering All Activities
in
Gravity Warm Air Heating
Forced Warm Air Heating
Sheet Metal Contracting
Air Conditioning
Ventilating
Roofing

AMERICAN ARTISAN

With which is merged

FURNACES AND SHEET METALS AND Warm-Air Heating

Vol. 102, No. 5 MAY, 1933 Founded 1880

Published Monthly by
Engineering Publications, Inc.
1900 Prairie Avenue, CHICAGO

Member of Audit Bureau of Circulations

Yearly Subscription Price — Anywhere in the world, $2.00; Single Copies, $.25. Back numbers $.50. Entered as second-class matter, July 29, 1932, at the Post Office at Chicago, Illinois under the act of March 3, 1879.

CONTENTS

More than 7,000 copies of this issue are being distributed.

True Talks

with successful sheet metal men

SERIES No. 3 **NUMBER 2**

A QUARTER CENTURY OF QUALITY

LARSONS OF CLIFTON, NEW JERSEY, STUDY THEIR CUSTOMERS' NEEDS...AND PRESCRIBE THE BEST METAL

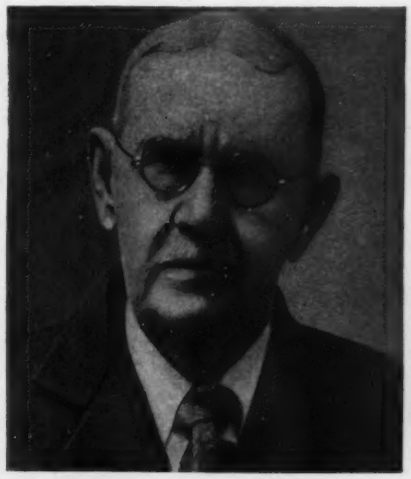
Maybe that explains why they have survived three depressions

ANOTHER ROOSEVELT was in the White House when Clifton Sheet Metal Works, Inc., of Clifton, N. J., opened their doors for business. Friends and neighbors warned them against starting in the midst of the panic of 1907, but J. G. Larson, President of the firm, had an idea that he felt would enable them to succeed. Let him tell it:

"We figured that if we studied what our customers want, and then gave it to them, we'd make out all right. That's been our policy right along, and we're still here."

By adhering to that policy, and living up to it in every detail, the Larsons have built up a thriving business in a New Jersey town of 50,000. A business that survived 1907, 1920 and is still going strong. Their circle of operations has spread beyond their immediate community to neighboring cities.

In their early days, when Monel Metal was comparatively unknown, they naturally had few calls for it. But as time went on and the new white metal's popularity began to grow, they found that some of their customers began to ask for it.



J. G. LARSON, *President, "Study your customers"*

A. F. LARSON, *Secretary, "Give them what they want."*

"So we gave it to them," said A. F. Larson, Secretary of the company, discussing their policies.

The Larsons soon found that by working with Monel Metal, learning how to handle it, and...above all...making every Monel Metal job as good a job as they knew how to do, they soon built up a reputation among customers who appreciate the best grade of work.

Being absolutely rust-proof and resistant to most acids and alkalies, Monel Metal met the requirements of chemical and textile plants.

Monel Metal's good looks and the case of cleaning it made it popular with food stores, butchers, markets and lunch rooms. One user sold another.

Soon the Larsons got a lot of profitable orders that less progressive sheet metal contractors couldn't fill.

This year, Monel Metal is being supported with the biggest advertising program in its history, reaching 10,603,900 families ...among whom are hundreds of thousands of men and merchants who use Monel Metal in their business. No other metal, no other material is so widely advertised, so well known, and so readily accepted as the last word in modern up-to-date equipment.

Perhaps that explains why the Larsons, like leading contractors everywhere, find such a wide understanding of Monel Metal's qualities and such a continuous demand for it from their customers.

Clifton Sheet Metal Works, Inc., Clifton, New Jersey.

Monel Metal is a registered trademark applied to an alloy containing approximately two-thirds Nickel and one-third copper. Monel Metal is mined, smelted, refined, rolled and marketed solely by International Nickel.

MONEL METAL

In defense of the • BUDGET

. . . he faces management's demand for PROOF of full value per dollar

Somewhere, in an executive office, a director of advertising rises in his chair. The budget—*his* budget—is questioned . . .

Vigorously he moves in defense of media, of space requirements, of insertion timing.

And yet, behind his defense, how certain is he of the underlying truths about the raw material his budget buys? About circulation volume, circulation values, the facts of circulation distribution?

Positively, accurately he knows these things if his budget covering advertising space calls only for publications of audited circulation.

He knows—and business accepts—the indisputable character of circulation facts from the Audit Bureau of Circulations. The full story of circulation practice is given freely and frankly by A. B. C. publications. They open up everything to the A. B. C. auditors and the Bureau in turn transmits the facts to you.

Make sure that your budget, this year above all years, rests upon *undebatable* values, upon *audited* circulations. Success or failure in many a campaign may hang on the extra margin of value that Bureau information can bring.

Take a share, now, in the budget-guarding work of the A. B. C. Help, through Bureau membership, to direct the more than 60 trained traveling auditors who cover almost every important publication in America.

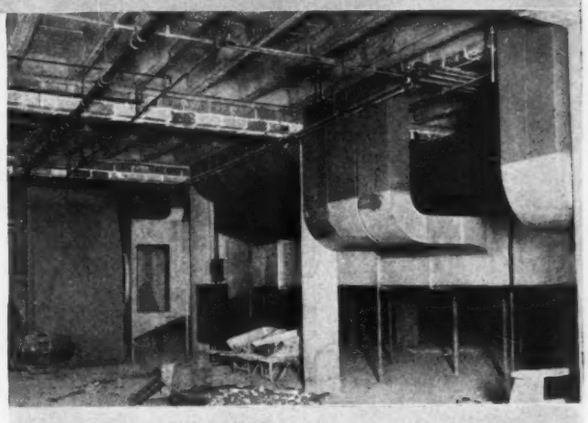
The distinguished group of advertisers, agencies and publishers who make up the Audit Bureau of Circulations invites you to join. Write today for the full, interesting facts about Bureau membership.

An advertisement by the
AUDIT BUREAU OF CIRCULATIONS
Executive Offices . . . Chicago

A ventilating job Noteworthy for its Thoroughness . . . . . with INLAND SHEETS

Exhaust ducts will supply each individual locker in the New Trier High School, Winnetka, Illinois

INLAND OPEN HEARTH STEEL



One of the exhaust fan units

INLAND STEEL SHEETS are being used in the ventilating system of the New Trier High School in the North Shore Chicago suburb of Winnetka, Illinois. It will be one of the largest school buildings in the country.

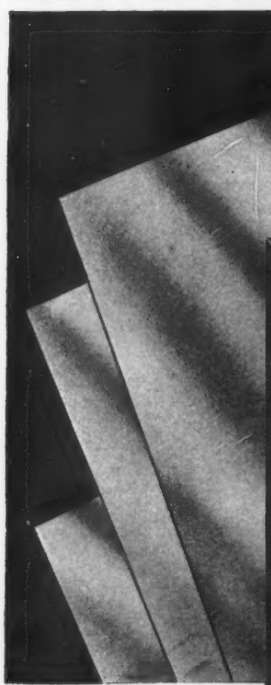
The high standard set for the installation is indicated by its health-guarding thoroughness. Even the lockers are directly connected to ducts. A total of 155,000 C.F.M. of air will be supplied.

However high your standards may be, Inland experience, Inland equipment, Inland control of quality from mine to you will meet those standards. Consult Inland on all your sheet steel requirements. INLAND STEEL COMPANY, 38 So. Dearborn St., Chicago, Ill.

INLAND STEEL

ABLE SERVANT OF THE CENTRAL WEST

Sheets Strip Plates Rails Track Accessories
Bands Structurals Piling Bars Rivets . Billets



AMERICAN USS STAINLESS and Heat Resisting STEEL SHEETS AND LIGHT PLATES

U.S.S. Chromium-Nickel Alloy Steels are produced under licenses of the Chemical Foundation, Inc., New York; and Fried. Krupp A. G. of Germany.

For Special Sheet Metal Work

A SERIES of Stainless and Heat Resisting Alloy Steels (chromium and chromium-nickel) are produced in sheets and light plates by this Company, and are capably adapted to every known use to which these products are suitable.

No factor has been overlooked, and nothing left undone to insure to users STAINLESS Sheets of highest *quality* and *utility*. These vary in properties, and likewise in cost. Our skilled technologists are available to assist you in securing the particular sheet or light plate best suited for your requirements. Literature descriptive of these products will be sent promptly upon request.

Chromium Alloy
Ferritic

USS 12
USS 17
USS 27

❖

Chromium-Nickel
Austenitic

USS 18-8
USS 18-12
USS 25-12

This Company manufactures a full line of high grade Black and Galvanized Sheets, Special Sheets, Tin and Terne Plates for all known purposes.

AMERICAN SHEET and TIN PLATE COMPANY
General Offices: Frick Building, Pittsburgh, Pa.
SUBSIDIARY OF UNITED STATES STEEL CORPORATION

PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES:

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American Sheet and Tin Plate Company
American Steel & Wire Company
Carnegie Steel Company
Columbia Steel Company
Cyclone Fence Company
Federal Shipbuilding and Dry Dock Company
Illinois Steel Company
National Tube Company
Oil Well Supply Company
The Lorain Steel Company
Tennessee Coal, Iron & R.R. Company
Universal Atlas Cement Company

Pacific Coast Distributors—Columbia Steel Company, San Francisco, Calif.
Export Distributors—United States Steel Products Company, New York, N. Y.

VOLUME 102 **AMERICAN ARTISAN** NUMBER 5

WARM AIR HEATING • SHEET METAL CONTRACTING • AIR CONDITIONING

Engineering Service

Every warm air heating contractor—and certainly every contractor in the forced air and air conditioning field—should give serious thought to the problem of free engineering.

We so designate engineering furnished by manufacturers because all manufacturers are losing money on their engineering service and many of the firms which claim to charge for this service really use free service as a lever to get dealers away from other manufacturers.

We believe that manufacturer's engineering, whether free or charged for, is harmful for the contractor.

Undoubtedly many contractors and some manufacturers will not agree with this, but this is to be expected since the industry was raised on the idea of manufacturers being godfather to their dealer's ills and mistakes.

We cannot deny that warm air heating is rapidly passing into a period when more complicated systems are coming into favor. We will see a wave of public approval for forced air and conditioning. We should not forget that as systems become more complicated the scheme of depending upon some manufacturer's representative becomes increasingly impossible.

In the past we may have called for help in selling and engineering every time we got a five-room prospect, but with all the problems arising in systems which employ electrical control, automatic operation, forced air, humidity and temperature control, filtering, etc., such dependence becomes silly.

We believe that every good dealer should be able to stand on his own feet. Certainly he should be able to engineer the "ordinary" installations. Where he gets a good prospect for a really "big" job he ought to be willing to pay for the services of a good engineer, close at hand, whose experience and guidance will enable the contractor to avoid mistakes, and guarantee it will work when installed.

This ability to stand on his own feet will also enable the dealer to meet any prospect or competition with answers to most of the technical questions. Any dealer's most embarrassing moment might well be when he answers—"I can't say, I'll have to ask my manufacturer's representative."

We should also remember that as air conditioning spreads out into competitive systems of heating a new type of dealer will arise. What he did previously will not matter. The manufacturers cannot be blamed for seeking outlets for their products which may not always be "furnace men." The man or the firm which will weather the coming great shifts in ways and means of manufacturing, distributing, engineering, installing forced air and air conditioning will be the man or firm which stands on its own feet.

We have the jump on the field. Will we maintain it?

▼ ▼

Spring Is in the Air

In our back yard we notice these mornings birds of all sizes and colors busily engaged in gathering sticks, grass, feathers, straws; anything which can be used to make a nest.

Despite the danger of being considered romantic or, worse yet, an 'ologist of high sounding ideas and big words like "psychology," we cannot help but speculate on this phenomena which is going on all over the country.

And we are also reminded that during the last few days men and women, young and old, hard boiled and sentimental have been heard to heave sighs and engage in conversation with perfect strangers about flowers and gardens, chickens and car overhauls, golf and fish, and how they plan to put the house and yard in shape for the outdoor season.

Spring is in the air.

The birds know it by instinct. And despite our background or mental superiority spring affects us exactly as it does the unreasoning animals.

This is the season when any contractor can call on Mr. or Mrs. Jones with ideas and suggestions for repairs around the home, for alterations, betterments, replacements, even such prosaic things as gutters and downspouts, flashings, boxes, roofs and be sure of striking an answering chord in the home owner.

Last month home owners were not yet over the "winter" feeling of let it go till spring. This month they are willing to think and plan, discuss and buy things we can offer which will make their homes more livable, more valuable, more enjoyable in the months to come.

Strike while the iron is hot is an old—but true axiom. We should follow it.

The close-up and full elevation photographs show the extent of the roof area and the general design of the copper application. The fabrication and application closely follow United States practices

Vancouver, B. C. Roof Requires Intricate Copper Fabrication

ONE of the most interesting and striking copper roofing contracts ever specified in western Canada, was completed last year by Western Steel Products, Ltd., Vancouver branch, on the steeply pitched roof of the new Canadian National Railway Hotel in Vancouver, B. C.

So steeply pitched is the roof that two full floors and an unusually high attic space are enclosed within the roof space. The high roof furnishes the dominating architectural feature of the building which depends largely on the handling of the roof area for close adherence to the style of architecture selected by the architects.

Not only is the roof of interest because of the large amount of copper required for sheathing, but there are also a number of interesting designs and fabrication details in the hips, dormers, finials, and cornice.

The Main Roof

The main roof is laid batten type, but customary batten cross section was rejected in favor of a batten having, in cross section, a rounded top and cut under base. The construction of this batten is shown in one of the details. This batten is fastened to the Gyproc roof slab by anchor bolts countersunk in the batten.

In covering the batten, separate rounded caps were formed on the job ready for locking. Copper clips of the usual type were used to hold

down the sheets, with a separate clip used on each side of the batten. The end seams of sheets were bolted through the cleat and passed through the gyproc by means of brass U-shaped bolts and washers and nuts on the inside of gyproc.

The battens are placed on 2-foot centers with the batten under cut ¼ inch to allow expansion in the pan sheet. All sheets are laid on insulation paper to keep the metal from direct contact with the roof slab. Both the pan sheets and the batten caps are 16-ounce copper.

The batten formation is also used on the roofs of the grouped and individual dormers and on the roof of the two end towers.

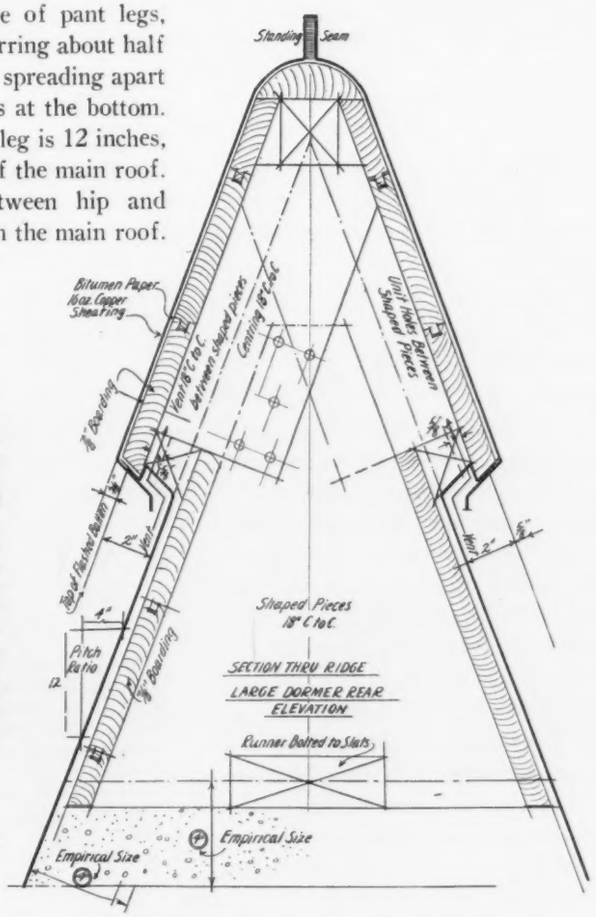
The Hips

The hips of the main roof and the large towers are so heavy in cross section that they form a very definite break in the ribbed appearance of the roof, even when viewed from the street, twenty floors below. This pronounced appearance is gained by forming the hips in rectangular shape some 12 inches across the top and about twice as deep from top to bottom as the battens which intersect them.

On the main roof the hips are identical in cross sections from eave to ridge. Battens and pan sheets are butted against the hips and the joint soldered tight. At the apex of each pair a cap is set into the junction to form the flaring base for the finial.

The hips on the towers are formed in the shape of pant legs, with the crotch occurring about half way down the slope, spreading apart some 2 feet 8 inches at the bottom. Across the top each leg is 12 inches, similar to the hips of the main roof. The connection between hip and roof is identical with the main roof.

In general, the method of covering ridges and deck eaves, follows the practice shown in this detail. Pan sheets are brought up behind the ridge or deck sheet and fastened to backup. The ridge sheet is formed for the drip. All ridge and eave sections are vented



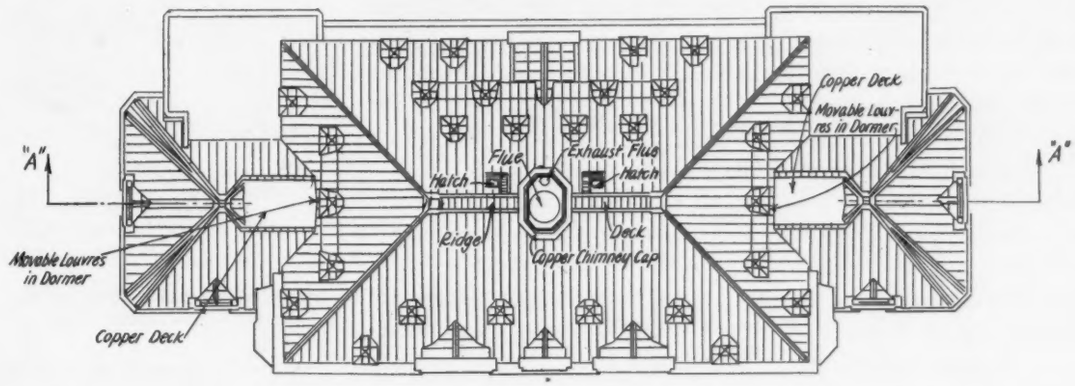
The Decks

From the photographs it would seem as though a peaked ridge is used on both main roof and towers, but the plan of the roof shows that both the main roof and the towers have small decks, which are edged by a rounded eave with the deck sheets laid flat locked and soldered over a wood sheathing. From the nose a steeply sloped face is carried down over the pan sheets and turned back and under to form a drip.

The Dormers

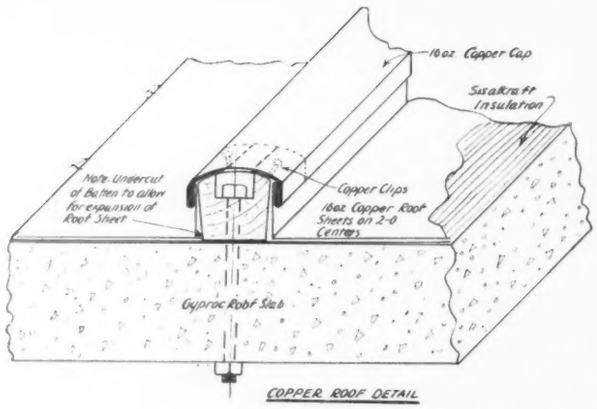
Each side of the main roof is broken by a series of dormers, placed along two floor levels. The location of these dormers which are cut through as individual dormers and as groups is shown on the roof plan.

The general type of roof used on



ROOF PLAN
Fin. Deck of Roof El. 523.75

The plan of the roof shows two large towers at the ends of the long axis with similar dormer design above. The front and rear roofs have a lower row of dormers which are windows and a second row which are louvred ventilators. On the rear roof there is a third row which are also windows



COPPER ROOF DETAIL

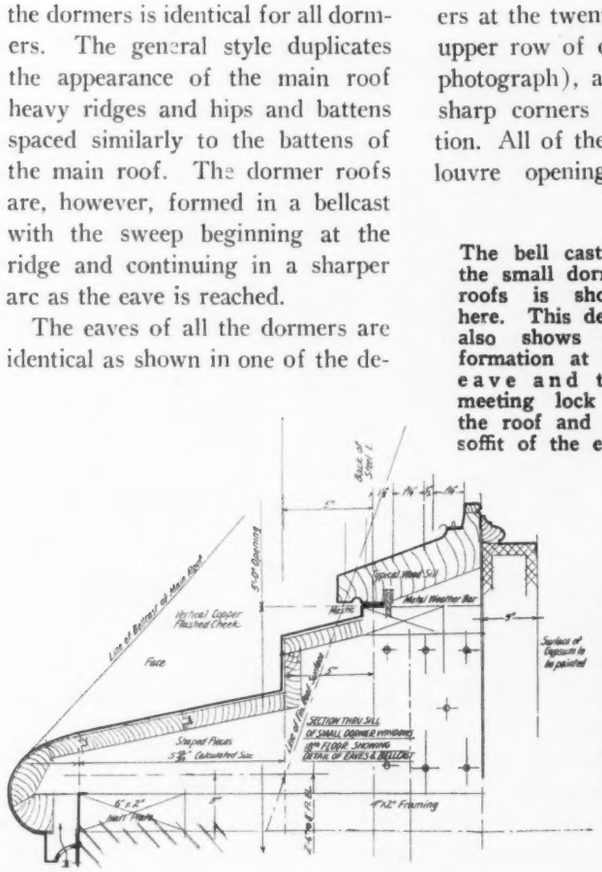
The battens used have a rounded top and cut under base. Battens are bolted and pan sheets are clipped into a double seam with the cap and pan sheet

the dormers is identical for all dormers. The general style duplicates the appearance of the main roof heavy ridges and hips and battens spaced similarly to the battens of the main roof. The dormer roofs are, however, formed in a bellcast with the sweep beginning at the ridge and continuing in a sharper arc as the eave is reached.

The eaves of all the dormers are identical as shown in one of the details. The pan sheet is carried over the nose of the eave and double locked with the sheet which forms the face of the molding around the three sides of the dormer. This molding is quite heavy and projects several inches beyond the face of the dormer. The dormers, like the main roof, consist of a fairly sharp bell, so the copper work was first placed on the dormer roofs and the battens are dummies humped up and filled with concrete and planted on the roof after the whole had been made water tight.

The faces and sides of the dormers at the twentieth floor level (the upper row of dormers on the roof photograph), are formed flat with sharp corners and no ornamentation. All of these dormers serve as louvre openings. The sills are straight up and down and sheathed by a continuation of the pan sheet which is brought up to form the face of the sill and locked at the bottom of the louvre blades with the flashing sheet.

The bell cast of the small dormer roofs is shown here. This detail also shows the formation at the eave and the meeting lock of the roof and the soffit of the eave



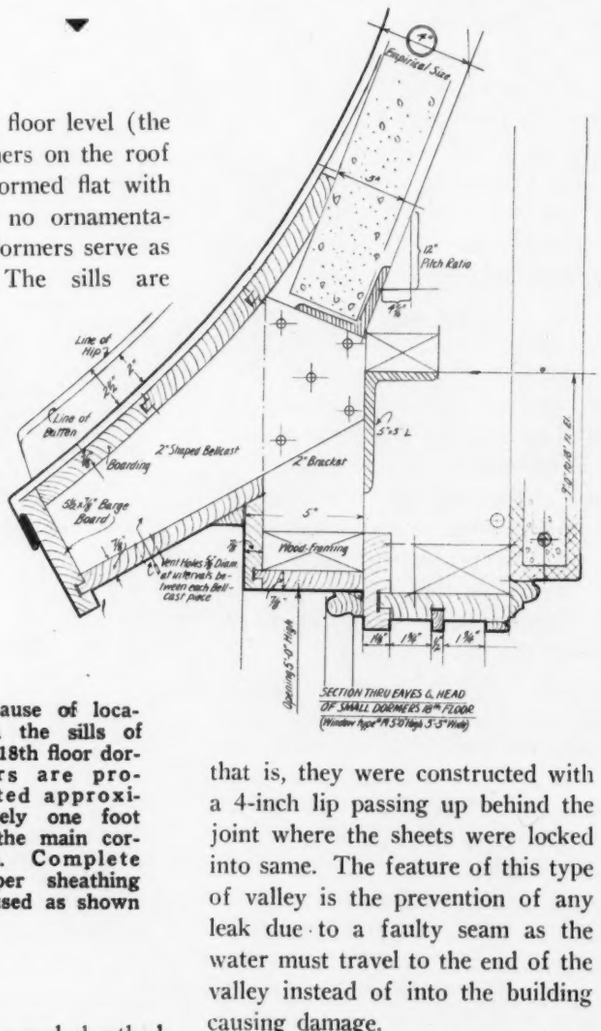
Because of location the sills of the 18th floor dormers are projected approximately one foot to the main cornice. Complete copper sheathing is used as shown

All of these dormers serve a louvre opening which are connected to fans on the 18th floor.

On the dormers at the nineteenth floor level the sills of the windows form a part of the eave of the main roof. This requires a very deep sill, shown on one of the details. The sill of the window proper is carried over the wood frame and into a grooved metal weather bar which is caulked. The deep sill cap is also brought into this weather bar space at the top and is turned around a nose and back against the face of the gutter at the bottom of the roof.

Valleys

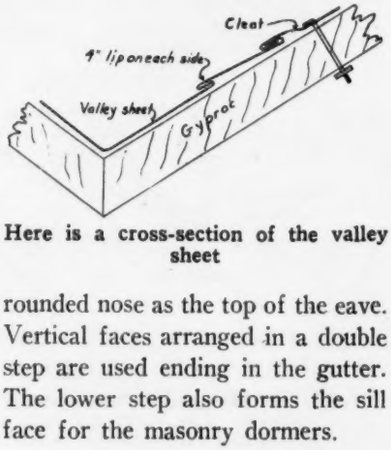
The valleys on all dormers and wherever required were fool proof,



SECTION THRU EAVES & HEAD OF SMALL DORMERS 18TH FLOOR

that is, they were constructed with a 4-inch lip passing up behind the joint where the sheets were locked into same. The feature of this type of valley is the prevention of any leak due to a faulty seam as the water must travel to the end of the valley instead of into the building causing damage.

The main eave continues this rounded nose as the top of the eave. Vertical faces arranged in a double step are used ending in the gutter. The lower step also forms the sill face for the masonry dormers.



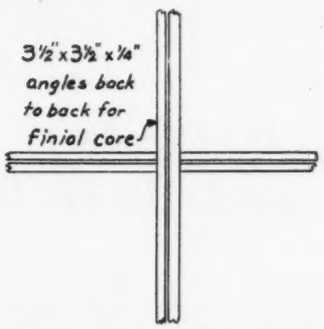
Here is a cross-section of the valley sheet

The masonry dormers and cornices from the ground floor up are set on copper pans which were placed in the stone work when the construction reached various levels. The following stone work holds them in place. These pans pass completely through the wall thickness eliminating any chance of leakage. All cornices were provided with generous drips so as not to stain the stone.

The Finials

The finials used along the ridge of the roof and towers are identical in size and formation. They consist of square apron about 2 feet on a side topped with a square base which projects some 6 inches beyond the apron. This base cap supports an octagonal section topped, in turn, by a circular vase base. From this point up all cross sections are circular assuming the form shown in the photograph. The finial from the base to the tip is more than 23 feet high.

The finials are all copper, no wood being used. The core of the finials is constructed of four 3½ by 3½ by ¼-inch angle irons welded together back to back and this core



This shows the angle iron frame use as the core for the large finial

in turn is fastened directly to an H column at the apex of the copper roof. After the core was bolted in position, the square base approximately 4 inches in depth and 2 inches to a face was slipped over the top of the core and fastened directly to the roof, cribbed by the general contractor and filled with concrete. The rest of the ornamental sections of finials were bolted to band iron frames taken to the core and bolted. Each finial consisted of five distinct sections and were all slid over the top of pole and locked by means of an inside Pittsburgh lock.

Field Work

The shop equipment was very ordinary, consisting of a 10 foot brake and shear, and all the lesser tools required in the fabrication of sheet metal work. A few gigs for bumping were used, these were made on the job.

All of the sheets used were formed on the job in a specially equipped and set up shop inside the attic space. Only a few special sections were fabricated in the Western shop. Wherever possible all roof sheets and hip sections were formed in ten-foot lengths which proved convenient for handing.

Sixteen-ounce copper was used for all the sections. The roof required more than 45 tons of copper.

Arrangements were made to enable the contractor to scaffold the complete roof at one time by working in conjunction with the general contractor; the masons first and then the sheet metal workers. The roof was finished from the top down which was made necessary by the large octagonal chimney which was erected first. The various levels of the chimney are covered with copper and lead. The scaffolding was all suspended from ½-inch diameter cable and was a feature of the job.

Blotters As Business Builders

BLOTTERS are effective advertising mediums for the furnace dealer, when they are widely distributed among prospective customers, and carry a concise message. This is the experience of Tom Fullerton, furnace dealer, located at Topeka, Kansas.

We distribute blotters throughout the year in our sales room," explained Mr. Fullerton. "Then each year I have a booth at the Kansas Free Fair, where I distribute 25,000 pieces of advertising literature, which consists mostly of blotters. Incidentally, my advertising at the Free Fair is a very helpful factor in broadening my sales field. As an example, some of our patrons live 30 miles from Topeka. I get in touch with about 150 good prospects each year by distributing blotters, booklets, etc., at the Fair.

"My firm has sold more than 3,000 furnaces since 1919. We have an extensive repairing and cleaning business.

"I find neatly printed blotters are very effective for bringing my stock and service facilities to the attention of prospects."

Back Bars—

Our Opportunity For Work From The Revived Beer Business

THE sheet metal contractor—just like all other business men—is looking at the beer business and wondering how he can cash in on the demand for equipment. In many communities the sheet metal contractor is planning campaigns to get his share of the work which must be done.

What, if any, are the prospects for this type of work.

The answer requires a brief analysis of the present status of beer and an examination of the needs of the dispensing agencies.

From past experience we can assume that for bottled beer the sheet metal contractor can hope for little work outside of special storage cases and relining work on old equipment.

The picture for tap beer is, however, much different. Tap beer will be sold over the counter by all kinds of agencies. The owner of the large restaurant or place selling beer will probably buy his units from manufacturers of this type of equipment. But such equipment costs real money—from a few hundred to thousands of dollars.

Taking the country as a whole it is reasonable to assume that the majority of dispensaries will be small places, selling a half barrel or so a day. Such places will be roadside stands, small clubs, small restaurants, drug stores, etc. Such dispensers will not be warranted in buying expensive equipment and will have to depend largely upon locally made equipment.

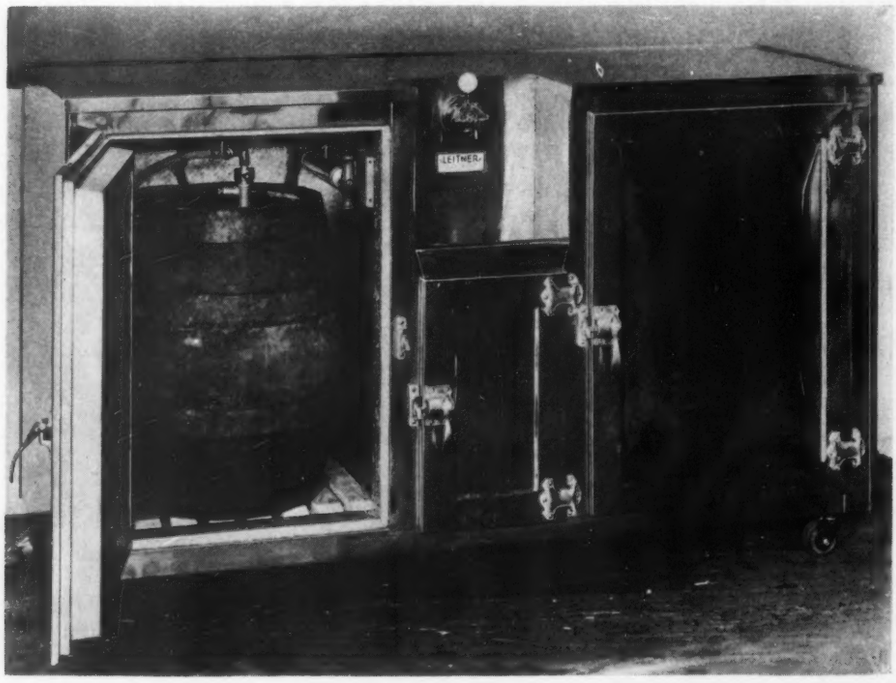
This is a field admirably suited to the sheet metal contractor's ability and facilities.

In general, the requirements of this dispenser will call for a unit known as a "back bar." This unit is housed behind the counter and contains storage place for one or two half barrels of beer, facilities for cooling the beer and the necessary faucets and piping to get the beer from the barrel to the stein.

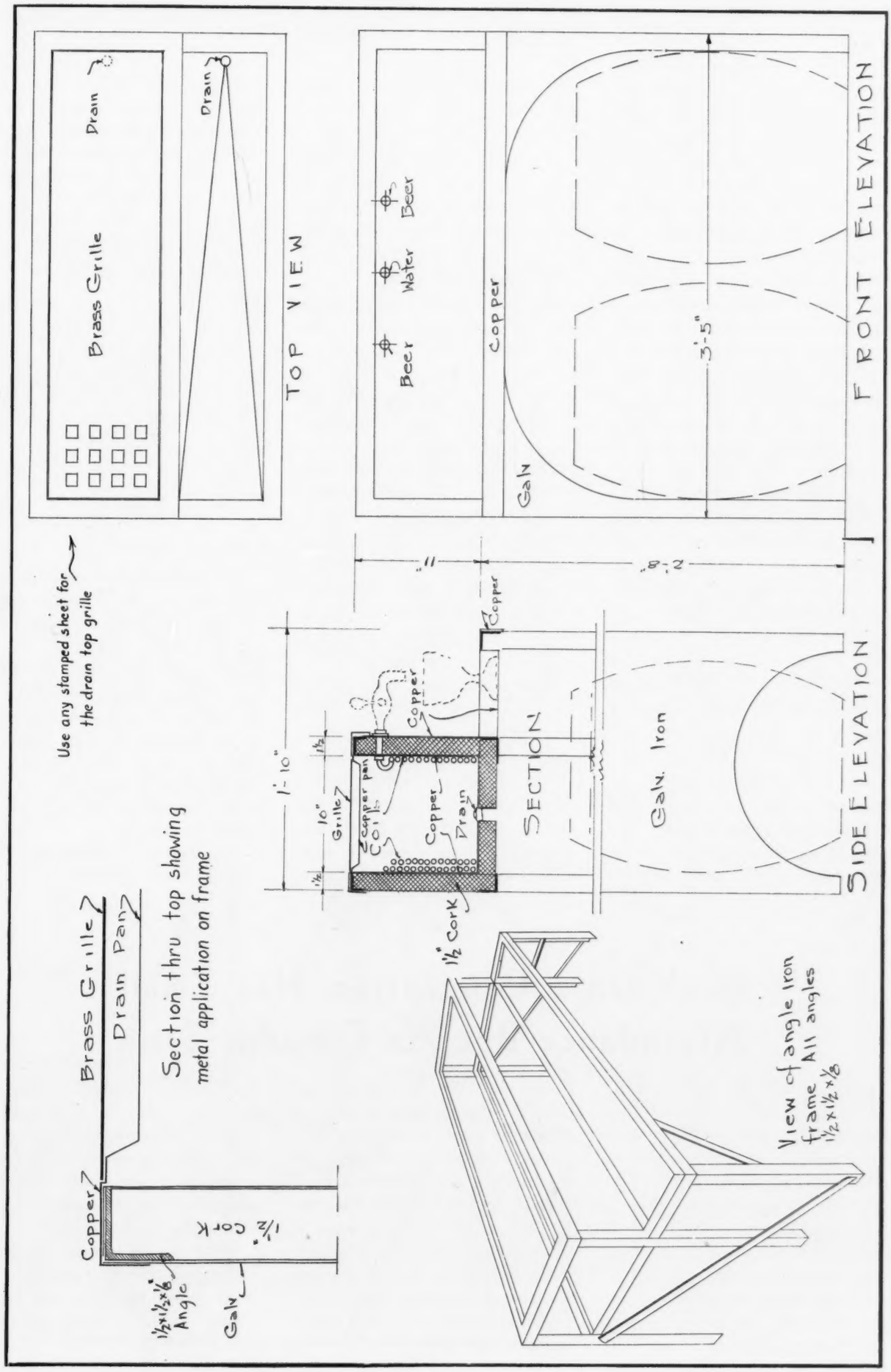
Cooling will be taken care of either by ice or refrigeration. Probably ice will be used because of low cost and no initial outlay for machinery. To get the beer from the keg to the stein requires some kind of a pressure system which may be either carbonic gas pressure or air pressure from a hand or hydraulic pump. The hand pump is cheapest and is satisfactory where service is spasmodic. The carbonic gas tank requires a piping system from the gas tank to the barrels, a job which probably will go to the plumber.

The sheet metal contractor can, then, expect to find his business from the fabrication and installation of low cost back bars. And since many of the places using this equipment are already serving beverages or meals the owner will have facilities for washing glasses and will probably have a cooler for bottled goods.

The accompanying sketches show a dispenser of the two barrel type. The frame is constructed of 1½x 1½x⅛-inch angles that may be welded, bolted, or riveted depending



This picture shows a type of portable bar which has space for two kegs or barrels of beer and the cooling box where the beer is cooled. Less expensive bars, made of many types of materials, can be fabricated in the average shop by the contractor. Photo by courtesy of Republic Steel Corp.



This drawing shows the frame, cabinet and cooling section for a back bar which can be fabricated in any average sheet metal shop

on the shop equipment. Welding will no doubt make a neater job. The coil box should be constructed of tin plated copper and the angle contruction made with the angles turned in to hold the slabs of 1½-inch thick compressed oak. The bottom slabs of cork are laid cross ways from angle to angle and the side slabs rest on the bottom layer. Three coils will be necessary. One for each barrel and one for ice water. The ice water might be eliminated and a small expense saved.

At one end of the coil box is a drain tube that connects the drain pan above the coil box to the trap below the bar. In case no plumbing is available a pail is set under this drain.

The back, sides and ends of this dispenser are covered with suitable gauge galvanized iron, but if a temporary or permanent bar is constructed in front of the dispenser this cover is optional.

The entire dispenser should be made in sections and so assembled that it is possible to take the entire apparatus apart. This makes it possible to clean all parts, and makes the dispenser portable.

The cost of such a back bar or dispenser depends much on the kind and weight of material used. The angle iron frame will require 60 feet of 1½x1½x⅛-inch angles or a total of about 100 pounds including waste. The cost of the material in these angles will be about 4 cents per pound or $4.00. The cutting and welding will require about 6 hours for two men or about $9.00.

Sixteen square feet of 24-oz. copper will be required for the coil box or 24 pounds. Lighter gauge copper may be used, but as coil box liners generally get considerable rough use, the heavier the better.

The face and lower drain pan are made of planished copper. The face may be made of 16-oz. material, but the drain pan should be 24-oz. The top rail around the top of the coil box may be planished copper but the upper drain pan can be plain cold rolled copper. About 18 square feet are required or about 18 pounds of material.

This is a total of 50 pounds of copper. The top perforated plate is shown of heavy brass which will cost around $20.00 but this may be made of plated steel or perforated metal for much less money.

Three coils made of block tin pipe will be required. Each coil should be about 30 feet in length. The supply connections enter the bottom of the coil box where the male end of the unions are soldered to the base of the box. The coil is connected to the tap thru the front with a union. The coils may be removed from the coil box and cleaned.

Block tin pipe ⅜-inch size and 5-ounce weight will cost about $47 per 100 pounds, f. o. b. manufacturer's shipping point, so 90 feet will cost about $13.25. The two beer and one water tap would cost about $3.00 to $7.00 each. The fittings, unions, drains, drain plugs, etc., should cost about $5.00 total.

Thus we have a cost of:

Angle iron frame	$ 13.00
42 pounds of copper at appr. 20c (plus polishing)	9.00
Labor, 10 hours for 2 men	15.00
Block tin pipe	13.25
Fittings, faucets, pump, etc.	27.00
Cork	1.50
Cost	$ 78.75
Overhead and profit	38.00
Total	$116.75

The contractor constructing this dispenser may find a market outlet through the stores that sell malt, bottles and bar equipment. Or he might load it on a truck and drive over the main highways and call on the roadside stands, and inns.

Patterns and template should be made and saved. This will raise the cost of the first dispenser, but will reduce the cost of the next unit by a wide margin.

Information on sources of supply and prices will be supplied.

Michigan's Convention Has Small Attendance But An Enjoyable Time

THE state-wide bank moratorium in Michigan presented an obstacle which even Michigan sheet metal and roofing contractors could not hurdle in getting to the 1933 Michigan state convention held in Bay City, February 28, March 1 and 2. Despite financial troubles, a representative group gathered to hear the addresses scheduled for the second day and transact important business on the last day.

Probably the most important piece of business taken up was the placing on record of the state association as definitely opposed to the practice of some manufacturers of built up roofing materials who take jobs direct and sublet the labor to some roofing contractor. The association proposes to use every power available to discourage this practice.

The consensus of opinion among members was that just as soon as the financial troubles within the state are ironed out there will be a pick up in business. Many of the banks were closed or on 5 per cent withdrawal basis with resulting paralysis of all transactions requiring any exchange of money.

Members and guests attending had an enjoyable time and look forward to better business and a customary Michigan attendance next year.

Jack Stowell Gets Pub-licity with A Jig-Saw Puzzle

JACK STOWELL, the "Let Jack Stowell Make It Hot for You," of Aurora, Illinois, believes in following the advice on selling, advertising and merchandising which he has discussed before so many contractor's gatherings all over the country. Much of the direct mail literature he has used successfully is original with him, but he also believes in adopting to his own particular needs ideas which he picks up from other sources.

For example, the cut out puzzle shown here, is an adaptation of the galvanized iron puzzle which is used by the Roosevelt Roofing and Sheet Metal Works of Woodside, Long Island. A story on the activities of the Roosevelt company was published in the February AMERICAN ARTISAN, and one of the pieces of advertising shown was this puzzle.

Jack saw the possibilities of this kind of advertising in view of the present craze for cut-out puzzles and worked out a similar puzzle in cardboard. Each piece of the puzzle carries an advertising message, so the prospect will read over the messages many times while working to make the perfect square.

Here is Jack's own statement of the way the puzzle has been used and the results obtained with it:

"Many thanks for the idea of the puzzle published in the February ARTISAN. I hope I am not infringing by copying it. This is giving us more publicity than anything for the money we have used.

"Before going to the expense of having a quantity of these puzzles made, we decided to send out 250 to see what reaction we would get. Of this amount, fifty were mailed to non-customers and prospects. The other two hundred were mailed to customers and prospects here in Aurora.

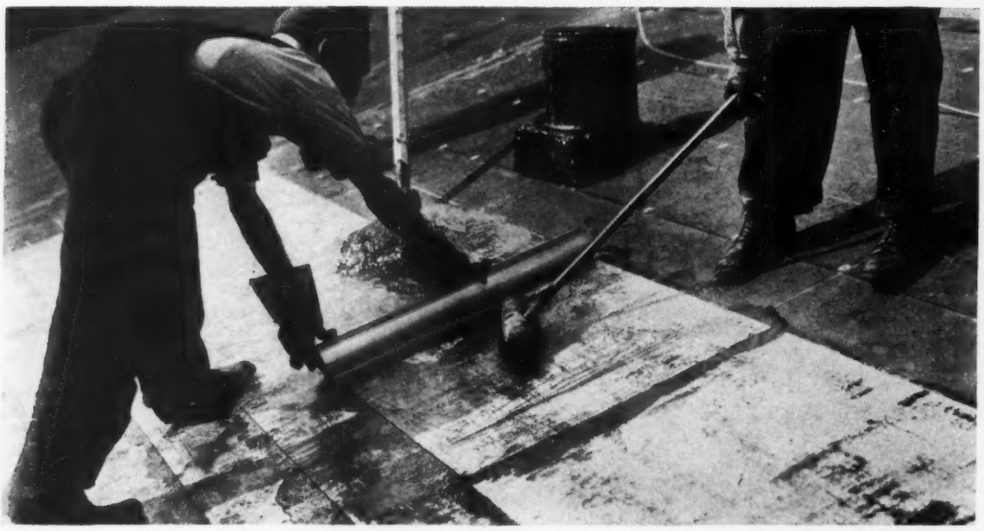
"This puzzle has given us so much publicity for the cost that we had a thousand prepared and mailed out to customers and prospects at once. We followed the same plan that we did with the first two hundred, that of enclosing a sheet metal letter and return post card, copy of which I am attaching.

"Of the fifty we sent to non-customers, seventeen wrote us letters commenting on the advertising value, etc. We have even had several long distance telephone calls, and any number of local calls both by 'phone and at the office, asking

if the puzzle could be done, or that we send one to a friend.

"At least a dozen jobs from people we did not know are traceable to the puzzle and many others came from it indirectly.

"Tying in as it does with the present puzzle craze, it has an added value. The puzzles cost us very slightly under 1c apiece. This covers the cost of the stock and printing; we do the cutting in our own ship in our spare time. It is the most advertising for the least cost we have ever done."



Something New in Roofing— Thin Copper Sheets Used Like Felt

IT used to be said that built-up roofing, of all the activities followed by the sheet metal-roofing contractor, has seen less change and contains fewer possibilities for radical development than any line of work commonly followed. Contractors have declared that a man might stay out of the built-up roofing business for twenty years and on coming back find the work still carried on just like it was when he left.

This year, however, built-up roofers have been given a new development to think about—the substitution of thin copper sheets for the felt heretofore used. This new product was introduced to the trade at the annual roofer's conference in Detroit in January by the American Brass Company, developers and sponsors of the idea.

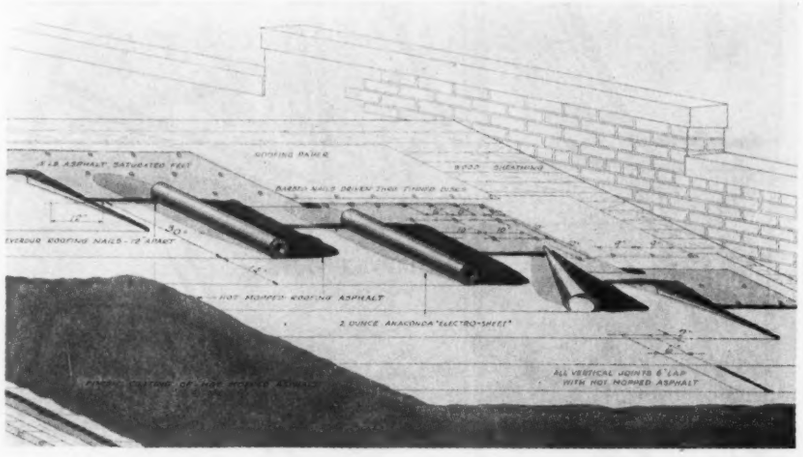
Since this idea will be discussed, tried and adopted by architects and contractors we present facts and figures. The photographs show some of the interesting application details. As shown, the application of the copper is practically identical with the application of felt.

For roofing purposes, the sheet is backed with an asphalt saturated fabric. It comes in a roll ready for laying. The heavier weights can be used for flashings where flexibility is essential.

While the use of copper has been tried out before the stumbling block was thin sheets, in long lengths, at moderate cost per pound. The new product is furnished in weights of from one ounce to eight ounces per square foot, in widths up to thirty inches (one ounce material available up to fifty inches) and unlimited as to length. The thin sheet copper is rust-proof, strong, ductile and relatively inexpensive.

In constructing a typical three ply built-up roof with this copper sheet, alternate layers of asphalt and the sheet are built up on the roof, the sheet used being thirty inches wide and weighing two ounces per square foot. The durability of metal makes the roof highly resistant to weather-wear. Although the top dressing of asphalt may, in time, develop cracks, there will still be the underlayer of copper sheets which the moisture cannot penetrate.

In addition to this, the copper and underlayer of asphalt are mu-



This drawing shows the recommended mmethod of laying a 2-ply copper-asphalt roof on wood sheathing. The thin copper sheets come in rolls and are laid like felt

Above—After the copper has been mopped down the surface is given the usual final covering with hot asphalt and a sprinkling of coarse mica spread with a brush

◆ ◆

tually supporting. The copper sheet protects the underlayers of asphalt from the ultra-violet rays of the sun, and prevent the evaporation of the volatile elements in the asphalt, thus prolonging its life. In turn, the asphalt acts as a cushion to the copper to protect it against physical damage. Blistering is also reduced because the copper prevents the absorption of air and moisture through capillary attraction.

It is said that these copper sheets can be laid for about the same cost as for applying a built-up asphalt or tar and felt roofing.

It is recommended that for flat decks, or for roofs having a pitch up to 2 inches per foot, a three-ply construction be used; while for roofs having a pitch of 2 inches to 4 inches per foot, the roof be two-ply. Built-up copper roofing is not recommended for roofs having a steeper pitch than 4 inches to the foot because of the tendency of asphalt to creep.

An additional feature of the idea is the fabric-backed sheet. This backing is a heavy cotton fabric, impregnated with asphalt and bonded to the copper by a coating of pitch compound. This backed sheet is recommended for flashing, gutter linings, ridge coverings, etc.

All of the sheets come rolled, making no change necessary in handling during application from the methods already in vogue. It is "mopped on" as are the other roofings, and when the two- or three-ply roof has been laid a finish coating of hot mopped asphalt is applied.

◆ ◆

Below—The roof is started by laying an eave strip which is fabric backed copper, quite stiff, then the eave strip is nailed and mopped down

Program for Spring Meeting, National Warm Air Assn.

Following is an outline of the program of the spring meeting of the National Warm Air Heating Association. The meeting will be held June 5, 6 and 7 in the Stevens Hotel, Chicago.

Tuesday, June 6

8:30—Registration starts.

10:00—Call to order.

10:15—A welcome to Chicago and Century of Progress Exhibition.

10:30—Merchandising for Profit in Our Industry, Clarence A. Olsen.

11:30—The Insulation of Buildings (Theory and Practice), M. A. Smith.

12:00—Code Committee Report, Prof. J. D. Hoffman.

2:00—Manufacturers meeting.

Wednesday, June 7

10:00—Research Advisory Committee Report, F. G. Sedgwick. Resume of the Research Work, December 1st to June 1. Introductory—A. C. Willard. Presentation of Recent Developments from our Research Work, A. P. Kratz.

2:00—Open Forum—1. Registers and Grilles for Mechanical and Gravity Systems, J. H. Van Alsburg. 2. Rackets in Our Industry, L. R. Taylor. 3. The Opportunity for Air Conditioning in Replacement Work, F. E. Mehrings.

3:30—Reports of Officers and Committees.

Thursday, June 8

10:00—Conference relative to the adoption of certain standards of definition and performance for various types of air conditioning equipment.

Direct Mail Builds Up Cleaning Business

Furnace Operation

Follow Operating Instructions furnished when furnace was installed.

Keep ash-pit clean. Burned out and warped grates are caused by ashes accumulating under grates.

Keep water pan on warm air furnace filled with water at all times. (We can install an Automatic Water Pan Filler for $18.00 complete.)

Have furnace vacuum cleaned at least twice a year. (⅛ inch of soot is equal to ¼ inch of asbestos insulation.) A clean furnace operates economically and efficiently.

For Vacuum Furnace Cleaning or Repairs Phone Us at 537

Heating Department

Sheridan Iron Works, Inc.

"Installers of Heating Plants that Heat Economically and Efficiently."

This Heating Plant Was Vacuum Cleaned

DATE	NAME OF WORKMAN

This card, size 5 by 8 inches, is tacked near every furnace cleaned.

HOW contractors get business is always interesting.

This is the story of a business-getting campaign using direct mail of unusual makeup to solicit cleaning, repair, replacement and air conditioning work during the spring, summer and fall of 1932.

The firm which conducted this campaign is the Sheridan Iron Works, Inc., Sheridan, Wyoming, a town of some 9,000 population located in the approximate center and on the northern boundary of Wyoming within sight of the Big Horn Mountains.

How the campaign was planned and put into action and the results obtained are explained by P. J. Theisen, secretary and treasurer of the company. He says:

"For many years past the warm air heating business in our city has been a hit and miss proposition, a condition usually found in cities of a similar size, isolated from the larger cities.

"Two years ago we decided to hire a heating expert and attempt to prove to the people that homes could be heated by warm air more satisfactorily than by any other method, and so far we have been very successful. We advertise furnace work consistently and in every case use a folder of a special design, which we find pays over the usual run of hand bills or small newspaper ads.

"Furnace cleaning, we all know, is in itself not profitable, but it does give us an opportunity to get into the home, see the condition of the heating plant and to check the furnace for broken or worn out parts. The customer on a furnace cleaning job where nothing but cleaning is required certainly gets plenty for his money, but we have all the information about his heating plant. At some future time this data will aid us in getting repair work, and the customer has tacked up in his basement a neat card like sample enclosed that he sees every time he goes to fire the furnace.

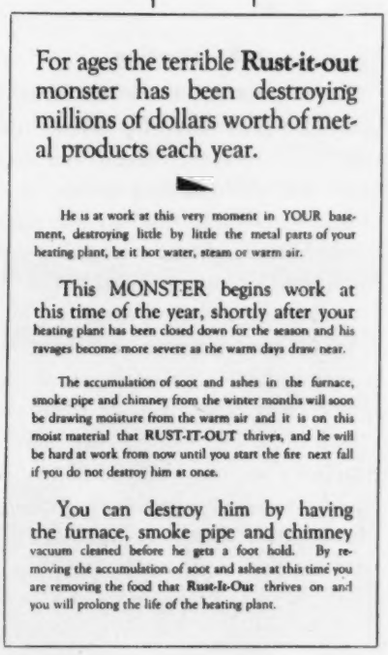
"Cheap competition is, of course, the greatest source of trouble in our heating business, especially during times of stress like the present. We all know that this cheap competition is made possible because the average furnace dealer does not understand the standard code, cannot figure heat losses by the B.t.u. or any other method, cannot lay out a pattern for a transition fitting, knows nothing about overhead, and after the job is installed does not know whether it will heat until after the plant has had a season's run. Then, if it heats to the satisfaction of the customer, he has a job to point to with pride(?). If it does not heat, it is the owner's fault—he did not fire properly, or the house leaks badly, or the prevailing wind is from a direction that will not allow some rooms to heat, or any one of a thousand other reasons.

"In our work we figure every job very carefully, then figure first class workmanship and material, show the customer how we do the figuring, how we arrive at the size of the furnace and the ducts, why the furnace should be placed in a certain position, why it is necessary to have warm and cold air registers in a certain place, etc., etc. In fact, we take him into our confidence, then when it comes to the price we give him a price that allows us to do the work as it should be done.

Above are the two outside pages of the "Rustitout" leaflet with its striking dragon and the story of air conditioning.

"If he springs a lower price on us, we simply tell him that we cannot make a better price (we have one price on a job and quote that at the very start), we have figured a job that will give satisfaction and it cannot be done for less, and that we will not do the class of work on which he has a lower price. It hurts sometimes to turn down a job when you could short cut it and get by, but we have built up a reputation that we cannot afford to destroy. So in some cases we lose a job, but eventually we will have the pleasure of overhauling the cheap job and putting it into condition to operate as it should.

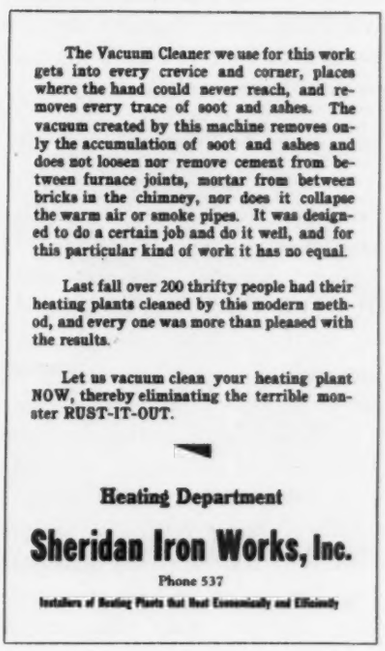
"When a competitor submits a cheap price to a prospect we have had first chance to talk to, the competitor has a tough time selling on price only, for we have taken the prospect into our confidence and told him, as mentioned before, how we figured the job, shown him on a colored sketch just where every duct and register will be located and also the size of ducts and registers.

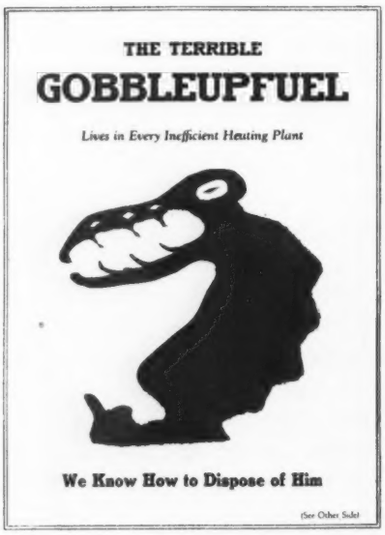


"The cheap fellow usually has a factory drawn plan, and all he knows is what it shows on the plan, so if the customer questions him a little, he is sunk before he gets a good start, and if the customer does buy on price alone he will be terribly discouraged when the plant does not heat properly or he goes into the basement and finds that all that was holding the warm air pipes together was a strip of asbestos tape and that half of the pipes have fallen down. In this case we have another convert and the man turns out to be a booster of the very best sort for us.

"Our RUSTITOUT folder was distributed last spring at a time when furnaces were being closed down for the summer. It was distributed to every home and business building in the city. Distribution was made by the publisher of a mimeographed circular used by local merchants to advertise special sales, it is well gotten up, has 100% distribution and, as near as we can find, has about 80% reader interest; in fact, the housewife is out on the porch before

Below are the two inside pages of the same leaflet setting forth the dangers of rust. This appeal for cleaning brought excellent results.





To the left and right are both sides of an 8½ by 11 inch red and yellow stuffer used for cleaning solicitation. Excellent returns are reported.

breakfast on Friday morning looking for the paper. By using this method we get more reader interest, for it is delivered at the same time as a circular that they are looking for.

"By using a folder like RUSTITOUT and distributing as mentioned, we have something different that is read. We distributed 2,035 of the RUSTITOUT folders and, while the returns were good, we of course did not get the volume of business that we would under normal conditions, but we did get an increase in fall business from this folder, for we had placed our name once more before the people. If upon starting the furnace they find the smoke pipe rusted out, they will blame themselves, for they did not destroy RUSTITOUT when we suggested that they do so.

"Be Different"

"In our advertising we try to have something different, as you have seen by our RUSTITOUT folder. In this case the title, RUSTITOUT, together with the cut of the monster, attracts attention and is interesting enough to cause one to look inside to see what it is all about. Note that we make no attempt on the cover to tell them what RUSTITOUT is, nor does our name appear on the front cover; therefore curiosity prompts them to open the folder, and on the inside they discover what the terrible monster is, that he can be destroyed, one method used to destroy him and who is in a position to destroy him.

"That is the story on the inside pages, nothing else to detract from the story; in fact, the two inside pages make a complete story, no reason at all for the information on the back page, BUT we have the back page, so why not use it, for we know human nature will cause the reader to look at the back page and when he does he sees the two words, CONDITIONED AIR.

"The average person reads each month several magazines, and in one of them at least his eye is surely attracted to the ad of one of the larger railroads that has conditioned air cars on their better trains for the comfort of their passengers. In other words, the words CONDITIONED AIR are not new to him and, to refresh his memory, we tell him on the line right under the heading where he saw these words before. Of course, they will give this only a passing thought in the spring season, but when the weather gets sticky a little later on they will think of us.

Fall Campaign

"Last September we distributed over 2,000 circulars of a similar nature and received from this one circular over 200 cleaning orders, several new jobs and resets, many new smoke pipes, duct overhauls and some good prospects for this fall.

"Our next circular, which we expect to get out soon, will carry photographs of one or more of the better class jobs that we have recently installed, also several photographs of various types of homes in which we have installed heating plants, this means being used to carry to the minds of the public the fact that their home can be successfully heated by the warm air method

be it large or small or located in the city or country.

"We might also say something about the printing of the circulars and booklets that we sent out. We do not use the cheapest class of printing, but get the best that our local printers can produce. Every one knows the eye appeal of color printing and they also know that it costs more than ordinary black and white. For that reason we use the equivalent of two color printing by using colored paper stock and then one color of ink. This is the equal of a two color job on white paper and in our estimation gives a lot better appearance.

Printer Makes Cuts

"The cuts used on our Rustitout and Gobbleupfuel folders are linoleum cuts made by our local printer and are very cheap. The drawings were made by the printer and he does not claim to be an artist. Any small city printer will probably be glad to make this type of cut for you if you suggest it to him. While it requires a little more skill to print successfully it will make a good job if handled properly. Most of the printers take trade journals the same as we do and they likewise get many ideas from these journals. In many cases they are a little backward in trying to put them into effect, but if you contact him and start the seed to sprouting you will find that he has many ideas that you can use to your advantage."

New York Association Holds Tenth Annual Meeting

Above: William J. Schmitt, Rochester, President. Right: James A. Heaphy, Syracuse, Retiring President

THE Tenth Annual Convention of the New York State Association of Sheet Metal & Roofing Contractors was held at Hotel Onandaga, Syracuse, N. Y., on April 3, 4 and 5. The registration of this meeting surpassed any of the previous nine meetings, with a total of about two hundred and ninety-seven. A great deal of credit for this large turnout must be given to the untiring efforts of the officers to make this meeting such a success. It was the largest ever held in New York State and one of the largest state meetings of recent years.

The New Officers

These are the officers elected to carry on during 1933: President, William J. Schmitt, Rochester; 1st Vice President, H. W. Noragon, Buffalo; 2nd Vice President, Edward F. Klick, Rochester; Secretary, Adolph Hesse, Utica; Treasurer, Otto Goebel, Syracuse.

Directors, term expires 1934: H. Bartholomew, Elmira, and William Karn, Utica; term expiring 1935, John Rauschke, Utica, and William C. Kirkpatrick, Buffalo; term expiring 1936, H. A. Daniel, Newburgh, and Thos. Woodard, Rochester.

Convention committees were: Resolutions Committee, T. Hillsdorf, Rochester; John Yager, Buffalo; P. Carroll, Syracuse; Joseph Steffarder, Syracuse, and G. Bettlem, Rochester. Trade Development

Committee, George Ballard, Rochester; H. A. Daniel, Newburgh; Adolph Hesse, Utica, and Mr. Boswell, Asterton. By-Laws Committee, H. A. Daniels, Newburgh; George Ballard, Rochester; Edward Klick, Rochester; William Schmitt, Rochester, and John Rauschki, Utica.

The Convention Business

John J. Yager, of Buffalo, reported out the following resolutions, which were adopted.

1. That the state association foster the forming of local associations throughout the state.

2. That the state association pass on to the craft information and all benefits derived from state association efforts and activities.
3. That the association members are opposed to the policy of coal dealers doing furnace cleaning, the policy of selling equipment and appliances direct to the consumer, and, further, that the secretary be instructed to obtain names of all equipment so sold and a list of such equipment be given to every member of the association.

Edward Klick, president of Rochester association, reported on changes of by-laws with the following recommendations:

Article 1, Sec. 1. That the association be known as the New York State Sheet Metal and Roofing Contractors Association in place of just New York State Sheet Metal Contractors Association. Also, that the part of by-

Above: Otto Goebel, Syracuse, Treasurer. Left: Adolph Hesse, Utica, Secretary

A group photograph of delegates and ladies attending the tenth annual convention of the New York State Association

laws reading that the New York State Association affiliated with the National Association of Sheet Metal Contractors agreeing to its constitution and by-laws of membership be removed, and all other sections be renumbered according to their order.

Article 8, Sec. 1. To read that an entrance fee of $5.00 must accompany membership application; also add to Sec. 2 all past presidents shall become members of executive and finance committee and have same powers as any director.

Sec. 3, Art. 10, shall be known as organization affiliate committee, consisting of president, secretary and one director, and elected by Board of Directors, whose duty will be to look into local and state association work in any part of the state and the expense to be paid by state treasurer from state funds.

Officers' Report

President Heaphy, in his report, thanked all the officers and directors who so earnestly co-operated with him during his term of office, feeling that the future success of the association rests on the interest shown by the association officers and the loyal support and co-operation by the members. President Heaphy stated that he was very fortunate to have had the support of his three predecessors, A. Hesse, George Ballard and H. A. Daniel, who were very active.

Some members desired to have the convention this year called off, but his opinion was that an ill wind always blows something good, and that this depression has made contractors realize more than ever that something must be done in the way of organization work. Mr. Heaphy said that he traveled around the state interviewing contractors in cities along the highways and byways. He addressed contractors in Rome association twice, once in November and again in March. Both Mr. Hesse and himself addressed the Rochester Association on the 22nd of March and then continued their work through the Mohawk and Hudson Valleys, personally contacted contractors in Herkimer, Little Falls, Scotia, Amsterdam, Schenectady, Troy and Albany.

He had spent considerable money on direct mail and advertising this year. He recommended that the secretary's office be equipped with mimeographing machine and other equipment to continue the bulletin work carried on the last few months.

Secretary Adolph Hesse gave his report which was accepted and Mr. Hesse was given thanks for his efforts during the year. He stated he had not been able to make as many contacts in his association work as

E. W. Mayer and Wm. Bowering; L. R. Taylor, Sales Manager, International Heater Co.; Thornton House of H. E. Hessler Co., all of Syracuse

he desired, but results of his efforts in this channel have been most gratifying. He expects to continue his organization work and organize all shops between Albany and Utica. He advised that during the last year he has sent out from his office over 4,400 separate pieces of literature to sheet metal contractors in New York State.

Treasurer Otto Goebel's report was read and accepted and rated thanks for his efficiency in being the "Watchdog of the Treasury."

Application for membership were received from the following:

C. J. Meyers, 569 Genesee St., Buffalo; R. W. Arr & Son, 8 Conklin Ave., Walcott; Ed D. Connally & Son, 38 Lewis St., Auburn; J. H. Urnland, 868 Jefferson St., Buffalo; Elliott Ryder, 135 River St., Buffalo; McEleroy Bros., Schenectady; Craig Co., Schenectady; Micheli Bros., 1725 State St., Schenectady; D. V. Quackenbusch, 133 Washington, Gloversville.

It was voted that the time and place for the next convention be left to the selection of the incoming board of directors.

The Rochester Association of Sheet Metal & Roofing Contractors again took possession of the large silver cup, which went to the association who received the largest number of new members into the association during the last year.

Many Valuable Addresses

There is not space enough, of course, to give in full the many interesting and educational papers delivered at these sessions. In order, however, that a complete resume of what was said may be available to readers, we brief the high spots of the various addresses:

B. H. Davis, Syracuse; Ed. Strauss, Rochester; Hugh Byrne and Raymond C. Lyons of Syracuse

L. C. Hamaker, Sales Promotional Manager of Republic Steel Co., Youngstown, Ohio, talked on "Possibilities of Corrosion Resisting Metals in the Sheet Metal Trade." He outlined the work being done by other manufacturers, as well as his own, to build up an acceptance in the consumer's mind for alloy metals, and explained that the foundation is being laid by these manufacturers, making it comparatively easy for the sheet metal man to get new business in seamless steel and other corrosive resisting metals. He briefly outlined the business for the sheet metal man in breweries, restaurants, etc.

Fred Barker, representative of First Trust & Deposit Co., gave an interesting address on "The Present Banking Situation" and injected a great deal of optimism and confidence in the gathering in future sound business practices and the elimination of fear in the minds of people, and said that banks are now being built on sound financial structures.

Ralph Manier, engineer of the Niagara Hudson Corp., discussed opportunities for the sheet metal and furnace dealer in selling gas house heating. He said that gas warm air heating today compares favorably from a price standpoint with the hot water or vapor job. When asked from the floor what his company's attitude toward merchandising through the sheet metal and warm air heating dealer, Mr. Manier stated that as soon as the sheet metal dealer goes after gas installation business and proves this in a definite manner, then the utility will withdraw from this field, but until that time comes the utility must remain in the field and contact consumers for gas heating business.

George Ballard, slate and tile contractor of Rochester, Vice President of the New York State Association of Sheet Metal Contractors, talked on "Slate and Tile Roofing."

Mr. Ballard made the following recommendations which were re-

George Ballard, Rochester; Herbert Bartholomew, Elmira; John J. Yager, Buffalo, retiring Vice President, and H. A. Daniels of Newburgh, a past President

ferred to Resolutions Committee for action at later date:

1. That sheet metal contractors and roofers go on record requiring slate manufacturers brand their product with proper identification; also insist that shipments of slate be itemized by number of pieces and sizes.

2. That the Association recognize the request of the National Association of Slate Manufacturers, that the contractor buy the product that is so specified by the architect, which is the result of the manufacturer's efforts to get his specialty in the plans.

H. A. Daniels of Newburg, past state president, talked on "Sheet Metal Work" and the "Mastick Bill." Discussed the possibilities of revival of the tin roof business in the sheet metal contracting business.

In discussing the "Mastick Bill," which provides that all public school buildings shall have a ventilating system that shall furnish 30 cubic feet of air a minute per person, Mr. Daniels stated that pressure is being brought to bear to have this bill removed, leaving no restrictions or regulations. He asked that all members go to their senators and assemblymen and oppose any legislation of this kind.

Mr. Bedlam of Johns-Manville Co. discussed the proper method of constructing built-up roofs. He recommended that a good flashing be used and it should go through the wall in order to assure a complete waterproofing job. Discussions from the floor were on bonded jobs and also on the sales policies of manufacturers of built-up roofing.

D. W. Norris of Lennox Furnace Co. addressed the association on air conditioning—"What air conditioning is, what you can do with it, what you cannot do with it." He stated that the public is now air condition-minded, that warm air is ideal for application of home air conditioning. The question will be, "Who is going to sell it " This is 100% the sheet metal and furnace man's job and Mr. Norris explained what air conditioning is—defined types of air conditioning, cooling, humidifying, de-humidifying. Stated that the health story was the sheet metal man's selling story; that the people today want clean air, with even temperature and proper humidity, and these qualifications are built into the sheet metal man's business, of warm air heating and sheet metal fabrication work.

A group of New York State salesmen in attendance at the Syracuse convention

Adolph Hesse spoke on "Betterments in Sheet Metal Association Work." Read communications from Wisconsin Association, requesting their association get behind the movement to keep the sale of air conditioning equipment by and through the sheet metal contractor.

The "Goss Bill" was discussed. The Goss bill would require that on all government jobs the general contractor must list all sub contractors' bids and amounts bid. The general contractor will not be allowed after he gets the general contract, to disregard the original sub contractor's bid and go shopping for bids. This bill will eliminate shop bidding.

H. T. Richardson of Richardson & Boynton Co. addressed the association on "Our Market Today and How We Can Take Advantage of Present Conditions to Better Our Business." In a very brief and emphatic way he said that this industry is going into a new world—a world made up of new manufacturers with new types of products. Many manufacturers are entering our industry with newly designed equipment for home air conditioning. Many of these manufacturers have no recognition in our industry. Some manufacturers have products of merit. Others with makeshift apparatus. It is up to the sheet metal contractor to separate the good from the evil. Many of these manufacturers will have all kinds of sales policies. They will sell through anyone, the butcher, the baker or candlestick maker.

Salesmen Elect Officers

The following Salesmen's Auxiliary officers of the New York State Sheet Metal Contractors Association were elected: President, John T. Stewart, Whitehead Metal Products Co., 304 Hudson St., New York City; 1st Vice President, C. B. Garlock, Acer-Whedon Co., Ilion, N. Y.; 2nd Vice President, John W. Stoner, American Brass Co., Buffalo, N. Y.; Treasurer, George W. Sox, H. E. Hessler Co., Syracuse, N. Y.; Secretary, Franklin E. Devlin, New York Metal Merchants' Association, 11 West 42nd St., New York City; Sergeant at Arms, John C. DeMuth, Whitehead Metal Products Co., Buffalo, N. Y.; Board of Directors, F. O. Carfer, Burhans & Black, Inc., Syracuse; Dan E. Edgerton, Vermont Structural Slate Co., Fair Haven, Vt.; A. J. FitzGibbons, C. G. Hussey Co., Buffalo; C. E. Stafford, Chase Co., Albany, N. Y.; J. R. Sullinger, Berger Bros. Co., Philadelphia, Pa.

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J. R.
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Automatic Heat *and* Air Conditioning Section

ONE of the exhibits counted upon to interest a large portion of the millions of visitors to Chicago's Century of Progress this coming summer and fall is the group of houses sponsored by building materials and service equipment manufacturers and housing designers.

Most of these houses will be air conditioned—cooled during hot weather and heated in cool weather. The equipment used to condition the air will be of the latest type and will be demonstrated as an operating part of the display house.

It is inevitable that visitors to these houses will be strongly curious and interested in the equipment, what it does and how much it costs. For most visitors these houses will be their first air conditioned residences.

Undoubtedly many false notions about air conditioning and its costs will be corrected in these houses. Wise contractors will advise prospects to visit the houses and will also make owners who have been through the houses their preferred prospects.

PACKAGES OF POWER FOR AIR CONDITIONING

WHERE CONSTANT SPEED IS REQUIRED . . . on humidifiers, atomizers, and other domestic air conditioning applications that require a single-phase vertical motor, General Electric recommends a Type KH resistance, split-phase motor of special construction (No. 1 at right).

This motor is further evidence of General Electric's ability to meet the requirements of the domestic air conditioning industry, with either standard or highly special motors in sizes from 1/750 to 3/4 hp., in all commercial voltages and frequencies.

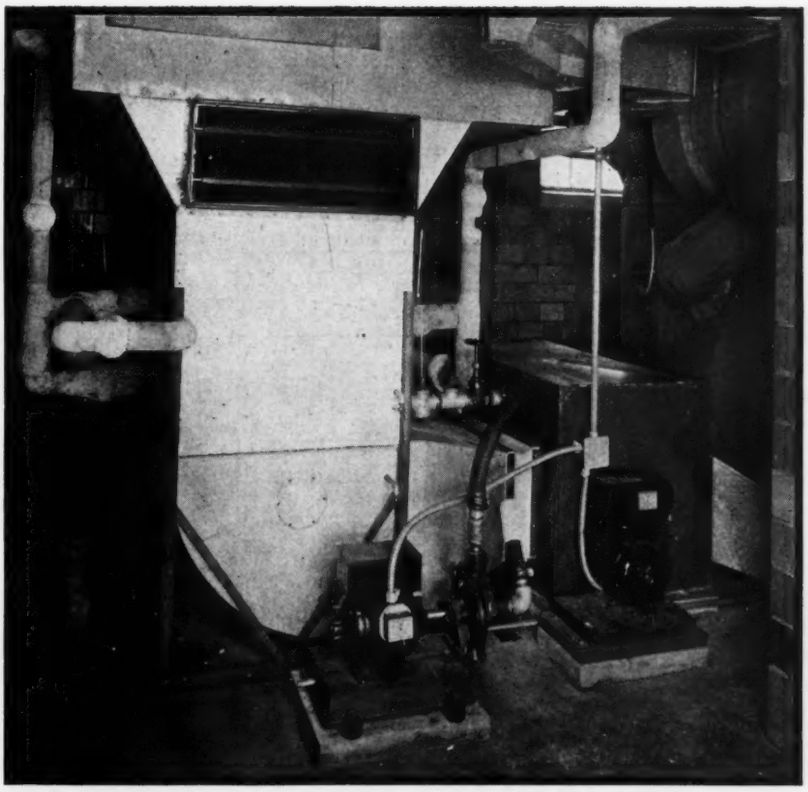
Our fractional-horsepower motor specialists, located in principal cities, will be glad to work with you in selecting the RIGHT MOTOR for the job. They will also tell you about the complete line of G-E electric equipment — control, transformers, wire and cable, etc.

Check those fractional-horsepower motor applications concerning which you would like further information, and return this coupon to the nearest G-E office, or to General Electric, Dept. 6-201, Schenectady, N. Y.

Air Filters
Air Washers
Atomizers
Automobile Heaters
Barn Ventilators
Bathroom Heaters
Blowers (all types)
Booster Fans
Bus Heaters
Cabinet-type Units for heating, cooling, humidifying, dehumidifying, washing, and filtering air
Domestic Air Conditioners
Exhaust Fans
Fans
Forced Draft Units
Furnace Fans
Garage Heaters
Humidifiers
Incubator Fans
Industrial Air Conditioners
Kitchen Ventilators
Paint Spray Booth Fans
Propeller Fans (all types)
Railway Car Air Conditioners
Railway Car Precooling Units
Refrigerator Fans
Room Coolers
Rotary Roof Ventilators
Schoolroom Heaters
Special Devices
Unit Coolers
Unit Heaters
Unit Ventilators
Window Ventilators

210-217

GENERAL ELECTRIC



Comfort Cooling

Part II

Cooling With Water

By H. J. Macintire

THE author desires to take every opportunity of saying that comfort cooling is an engineering job and every job, certainly at the present time and until the relative details of the design are well established, must be carefully analyzed as regards its operating and fixed costs.

In the case of comfort cooling, the problem in the states along the northern boundary of the United States is the short cooling season. A survey of the comfort cooling season for Urbana, Illinois, for the last 45 years, for instance, indicates that the cooling season is very uneven and appears to extend over a range where the maximum is eight times the minimum. For Urbana the average temperature is 82.2, average minimum is 77.6 and the average maximum is 86.5 deg. F. A more northern locality would undoubtedly show a lower temperature and a shorter cooling season, and a more southern city would have a longer and more severe comfort cooling season. The short comfort cooling season should have a cheap first installation cost, even though the operating cost may be greater, whereas where the operating season is long, the first cost can be a maximum, providing the operating cost can be lowered. These statements are true for any engineering problem.

Cooling With Water

Surface water, including small lakes and ponds and rivers, has a summer temperature approximately that of the average temperature of the air during the months of June, July, August and September. According to the reports of the U. S. Government, the surface temperature of water of about the latitude of Milwaukee is about 71 deg. F. For Chicago it is about 73°, Indianapolis it is 75° and St. Louis it is approximately 78 degrees. Deep well water is understood to have the average year 'round temperature for the locality where the well is located and for Milwaukee the temperature is found to be about 50°, Chicago it is 52°, Indianapolis it is 55° and St. Louis the temperature is approximately 57° F.

The temperature of such water does not change appreciably from month to month, and it may be secured by digging down to a water bearing gravel—sometimes only a few feet below the surface or sometimes 2,500 feet or more, as in the case of the stockyards in Chicago. The water usually rises somewhat after the well reaches the desired gravel strata as in the case of the Chicago stockyards, where the water has to be actually pumped only about 300 feet in order to reach the surface of the earth. On the other hand, the water supplied to the water system from Lake Michigan is seldom as high in temperature as 70 degrees.

According to the comfort cooling research at the University of Illinois during the summer of 1932, an effective temperature of somewhat higher than 72 degrees may be used for residence cooling. According to the average results of these tests, a dry bulb temand a relative humidity of 45 per cent was maintained with satisfaction to those living in the research house during the summer.

It is probable that no fixed differential temperature between the inside and the outside air should be attempted, because the better the construction of the house, the slower the inside temperature will follow the outside air temperature. As a matter of fact, a fixed differential could not be secured at the research house except under great difficulty, such as by heating

Floor	Room	Volume Cu. Ft.	Glass Area Sq.Ft.	Net Wall Area Sq. Ft.	Ceiling and Floor Area Sq. Ft.	Linear ft. of cracks	Heat Gain, B.t.u.per hour				
							Glass	Walls	Ceiling	Cracks	Total
1	Dining Room	1710	29.3	97	190	37.7	331[a]	231[b]	-	452[c]	1014
1	Breakfast Nook	454	11.3	41	50	16.5	128	98	-	198	424
1	Kitchen	1415	31.5	183	157	38.0	356	435	-	455	1246
1	Hall	1430	35.8	84	161	84.0	405	200	-	1010	1615
1	Reception Room	2400	87.8	334	267	56.5	991	795	-	677	2463
2	S.W. Bedrm.	1472	38.2	182	173	35.0	432	433	873[d]	420	2158
2	Bath	485	8.2	58	57	14.0	93	126	288	168	687
2	N.W. Bedrm.	1533	38.2	277	180	26.3	432	660	908	316	2316
2	Hall	1598	19.7	108 56	188	17.5	223	257 71	950	210	1711
2	Masters Room	2270	63.7	334 25	267	43.8	720	795 35	1350	525	3425

Total heat gain, B.t.u. per hr. 17,059

aHeat gain for glass = Area of glass × Coefficient × Temp. diff. = 29.3 × 1.13 × 10 = 331 B.t.u. per hour.
bHeat gain for Walls = Area of Wall × Coefficient × Temp. diff. = 97 × 0.238 × 10 = 231 B.t.u. per hour.
cHeat gain due to window cracks = linear length of crack × Coefficient × Temp. diff. = 37.7 × 1.2 × 10 = 452 B.t.u. per hour.
dHeat gain for ceiling = area of ceiling × Coefficient × temp. diff. = 173 × 0.202 × 25 = 873 B. t. u. per hour.

Table I

This table is a cooling data sheet serving the same purpose as the usual data sheet compiled to design a heating system. The table is simple in construction, accounts for all heat sources and shows below the formulas used to establish the heat gain in B.t.u. per hour

the air in the house during part of the morning. Such an attempt is absurd, so that with the better building construction a fixed difference of temperature is impossible, although calculations will need to be made for some amount like 10 deg. F. (See Fig. 1.)

Also, it was found during the comfort cooling research that the comfort cooling load was not a constant per degree difference of temperature, but that it increases as the outside temperature rises.

The dehumidification load was found to be about 25 per cent of the so-called sensible heat load due to the actual lowering of the temperature. Remember that no attempt at providing fresh air to the residence was made, as tests indicated that the entire volume of the inside air was replaced in from 1.0 to 1.4 hours by infiltration only. The results of the research showed, also, that the actual cooling load did not show the extremes that the calculated load did and that it plotted as a much more uniform load (see Fig. 3, April issue). With this in mind, Table 1 has been prepared as the data sheet to show an approximation of the actual amount of heat that will have to be absorbed by the cooling agent.

In Table 1 the maximum sensible heat load is shown to be 17,059 B.t.u. per hour. This compares reasonably well with the values found on test at the research house (see Part I of this series), but the fact remains that the atmospheric air varies in temperature very rapidly during the summer, and on July 14 at 4 o'clock (see Fig. 3, April issue) in the afternoon the dry bulb temperature difference was as much as 21 degrees, whereas at 8 A. M. it was 7 deg. F. and at 9 P. M. it was about 9 degrees—but the inside dry bulb temperature was very nearly constant at from 80 to 81 deg. F.

The air delivered to the register faces varied from 60 to 70 degrees and the air velocity varied from 50 to 450 feet at the registers per minute. In order to secure air at 60 deg. F., the water temperature must be at least 55 degrees, unless it is permissible to use considerable water.

As 55 degree water is available at Urbana from deep wells, let us see how the use of water will work out for the research house using a sensible heat load of 17,059 B.t.u. per hour and a dehumidification load of 25 per cent of the sensible heat, or 4,265 B.t.u. per hour, making a total of 21,324 B.t.u. per hour.

Table 1 is very illuminating and may well be considered carefully in comparison with the graphic log Fig. 3, April. The outstanding factor of heat gain is the vast amount of heat entering through the ceiling, which in the research house was unprotected except for one inch of felted insulation on the joists above the ceiling of the second floor, northwest bed room which incidentally was unfloored. Such constructions add to the discomfort in a very decided manner, as the ceiling behaves like a large panel radiator right over the occupants. An observation of the graphic log shows that the attic temperature is between

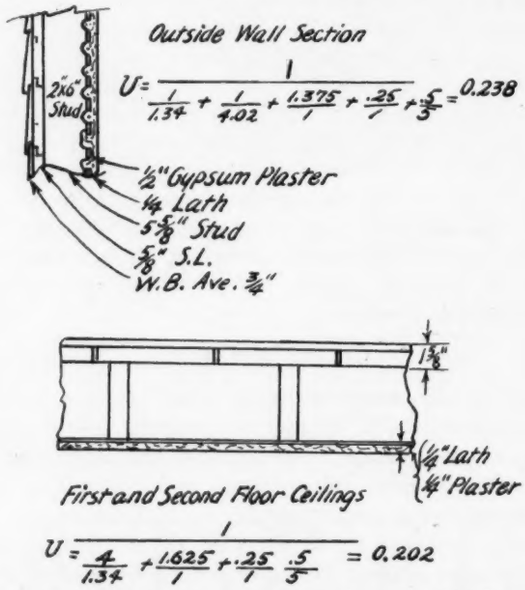


Fig. 1—This shows the construction of wall and ceiling and the formula for determining the coefficient of heat transmission all worked out

20 and 30 degrees higher in temperature than the ceiling in the northwest bed room, and for a considerable period of time it was above 25 degrees. This indicates a large heat gain.

Although it is customary to use a temperature difference of 25 or even 35 degrees F. as the difference of temperature between the inside and the outside temperature for those walls exposed to direct sunlight the calculations in Table 1 are made with *10 degrees only*. The reason is that the research residence happens to be very well shaded with trees and houses. Another house, less shaded, should be calculated with a greater loss. The author has attempted to use the results of tests on the research residence to modify his previous ideas on comfort cooling calculations, but a more conservative calculation would need to be made in another setting.

Awnings

Again mention should be made of awnings. Tests indicated that awnings reduced the sensible heat gain by 22 per cent, and that 83 per cent of the solar heat reaching the windows penetrated into the house. It is, of course, possible that a house would be comfort cooled without awnings, but it does not seem sensible. The author considers awnings essential. The infiltration of air should be given more than passing interest, as the table indicates as much as ¼ to ½ of the entire sensible heat load was due to cracks. The gain of heat of 1.2 B.t.u. per ft. of crack per hour per 1 deg. F. difference of temperature is for 1/32-inch crackage. Regions of more than average air movement should have a larger factor. Weather stripping really should be included in residence construction, in which case the leakage factor will be decreased.

Using a rise of water temperature of 10 deg., the water will absorb 10 B.t.u. per pound and the amount of water needed will be

$$\frac{21{,}324}{10} = 2{,}132 \text{ lb. per hour}$$

or $2{,}132 \div 8.33 = 256$ gal. per hour,
or 4.26 gal. per minute.

This amount of water, 4.26 gallons per minute, is not unreasonable and probably is a satisfactory solution of the problem of residence comfort cooling where sufficient water at 55 deg. F., or under, is to be had at reasonable cost.

Method of Cooling

If water is used for cooling it may be sprayed by means of an atomizing spray and a spray chamber with eliminator surfaces or it may be passed through coils which may be with or without fins. In general, the idea of sprays makes an appeal because of the ability to wash the air. However, it is not clear that the washing is very effective, and the ordinary residence is not subject to much need of washing. As forced circulation of the air in the stacks and risers is required, undoubtedly the use of suitable filters in the system will be found much more effective. It is a fact, also, that any cooling coil is always wet because considerable water is continually being condensed and this will provide some means for the absorption of odors. However, a modern residence does not require much more means for air washing in the summer than in the winter.

Where sprays are used, the usual design calls for a nozzle for each 0.8 sq. ft. of cross section of the spray chamber and the velocity of the air in the chamber is limited to about 500 feet per minute in the larger sizes and 400 feet per minute in the smaller ones.

If the air could be cooled to 60 deg. F. and the air temperature leaving the rooms is assumed to be 80 degrees, the amount of sensible heat absorbed by one pound of air will be

$$20 \times 0.24 = 4.8 \text{ B.t.u.}$$

and the number of pounds of air will be

$$284.3 \div 4.8 = 59.2 \text{ lb.}$$

where 284.3 equals the B.t.u. per minute which must be absorbed (17,059÷60)

The amount of air in cubic feet will be then

$$59.2 \times 13.33 = 790 \text{ cu. ft. per min.}$$

where the 13.33 is the volume of 1 lb. of air at 60

(Continued on page 38)

This chart was compiled from tests at the Research Residence last summer. It points out forceably the reduction in cooling load effected by the use of awnings. Every cooling installation should have a full compliment of awnings to reduce costs

TEST NO	DATE 1932	LENGTH OF TEST	WEATHER SKY	WEATHER SUN	WEATHER WIND	AVER. TEMP. OVER 4 HOUR PEAK PERIOD Outdoor Air	Indoor Air	B.T.U. PER HR. PER DEG. DIFF. IN OUTDOOR-INDOOR TEMP. UNCORRECTED FOR BASEMENT TOTAL	UNCORRECTED FOR BASEMENT SENSIBLE	CORRECTED FOR BASEMENT TOTAL	CORRECTED FOR BASEMENT SENSIBLE	RATIOS OF COOLING LOAD S	RATIOS OF COOLING LOAD T	PERCENT REDUC. IN LOAD WITH AWNINGS S	PERCENT REDUC. IN LOAD WITH AWNINGS T
SERIES A. AWNINGS IN POSITION. CLEAR BRIGHT DAY															
9	7-13	13.5	Clear few Cum	Bright	Mild	97.5	78.8	1650	1192	1297	840				
11	7-15	24.0	Clear	-	-	101.3	81.9	1660	1330	1320	990				
12	7-16	24.0	-	-	-	94.8	81.8	1627	1282	1120	775				
14	7-20	24.0	Few Cum	-	-	95.5	80.7	1646	1254	1199	808				
						Average		1646	1265	1234	853				
SERIES B. AWNINGS REMOVED. HAZY DAY WITH SCATTERED GREY NIMBUS CLOUDS															
21	8-15	10.5	Cldy	Dull	Calm	84.9	76.7	2273	1779	1468	975				
26	8-25	13.0	-	-	Mod	87.5	77.9	2135	1661	1448	974				
						Average		2204	1720	1458	975				
SERIES C. AWNINGS REMOVED. BRIGHT DAY WITH SCATTERED WHITE CUMULUS CLOUDS															
22	8-16	13.5	Part Cldy with few white cumb has clouds	Bright but sun in and out	Calm	89.3	78.0	2107	1638	1524	1055				
27	8-26	12.0			Mod	85.8	76.9	2205	1742	1464	1000				
28	8-29	24.0			Mild	93.1	79.0	2063	1608	1596	1140				
29	8-30	24.0			Mod	94.2	79.8	2167	1612	1708	1153				
30	8-31	24.0			Mod	91.9	78.5	2004	1582	1512	1088				
						Average		2109	1636	1561	1087				

AVER. CORRECTED FOR BASEMENT — 0 400 800 1200 1600

SERIES A — T 1234, S 853 — 0.78 — 0.79 — 22 — 21

SERIES B & C — T 1458, S 975 — 0.90 — 0.93 — 10 — 7

SERIES C — T 1561, S 1087 — 1.00 — 1.00 — 0 — 0

NOTES: Awnings on all East, South, and West windows. 19 in number. Windows closed and locked; window shades drawn half way down.
Total cooling load is the sum of the "dehumidification load" and the "sensible heat load."
Basement correction for heat load includes heat losses in basement from ice tank, coils, piping, etc.
Values in above table were based on results obtained during the 4-hr. period of max. outdoor temperature.
All 4-hr. peak periods were preceded by several hours of actual plant operation.

Twenty-one architects and builders out of twenty-five invited, inspected this installation and pronounced the design, workmanship and operation surpassingly good. Each visitor received a postal card carrying this picture of the heater as a memento of the visit

"Excellent"

Declared Everyone Who Inspected This Job

"WELL, you can't sell furnaces in the 'big' homes of Kansas City—it's a hot water town if there ever was one. Worst of all, the architects were raised on steam and hot water and you can't get past the gate to talk warm air."

Sounds pretty familiar, doesn't it? And certainly not confined to Kansas City, when we remember how many "lost jobs" we have alibied on the same excuse.

But in Kansas City there really was some truth in the claim of hot water supremacy for the expensive system because the architects really were water and steam minded.

This is the story of how that situation was split wide open in the last six months through the aggressiveness of one warm air furnace organization—Hunt Brothers—three brothers who refused to be licked and who literally pulled themselves up into air conditioning by their boot straps.

The story revolves around a single installation—a system installed in the new home of Mr. and Mrs. Frank Logan. Mr. and Mrs. Logan had heard about air conditioning—in fact they wanted it in their new home and told the architects, Buckley and Van Brunt, that they would pay more for a conditioning system than for steam or hot water. The general contractor therefore had his orders and was receptive to the proposals submitted by Hunt Brothers.

Making the Job Advertise

Probably the most remarkable feature of the whole story entails the advertising value imposed upon the installation by the Hunt firm.

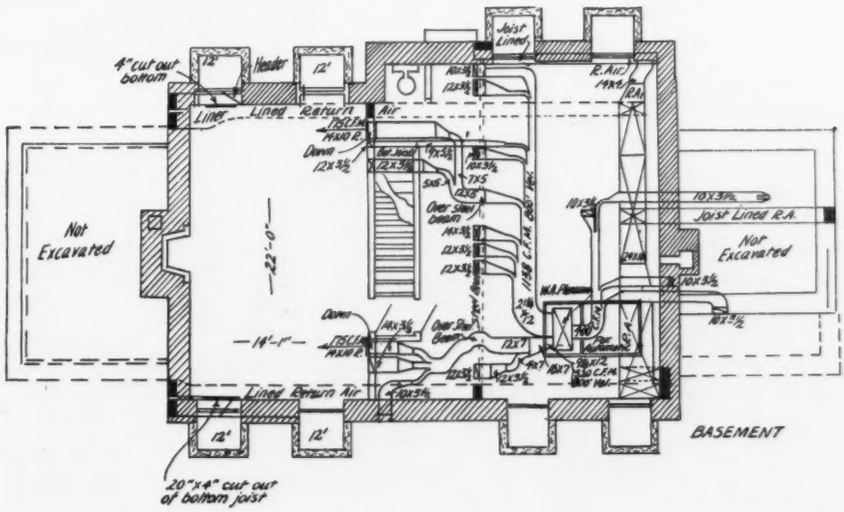
Just after the job was completed, a period of zero to 10 above weather visited Kansas City for a week. Everything about the system worked beautifully. So the Hunt brothers determined to see if the architects and builders were as impregnable as always. Arthur Hunt sat down at the phone and called twenty-four architects and builders—the best in the city—and invited them to inspect the Logan installation. He offered to pick them up at their convenience, drive them to the house, let them stay as long as they wished and guaranteed to answer any and all questions about air conditioning.

Twenty-one of the men called accepted the invitation and spent collectively many days going over the job and asking innumerable questions. At the end of the week each man who visited the house was mailed a postal card with a picture of the furnace (just as we show it in the illustration) as a reminder of the visit.

Here is a digest of the comments and the things which seemed to interest these visitors most:

"It certainly is a good looking furnace installation; about the most attractive I've ever seen."

The design and installation of this conditioning system was worked out completely by Hunt Brothers. The features which attracted most interest are the duct system and the highly satisfactory operation of the installation



"Placing the conditioner in a corner with the ducts flat and above head level gives much added space and gives a clean sweep through the basement."

"There isn't a piece of asbestos paper in sight; I thought every furnace man had to use asbestos paper to hold the job together."

"The automatic control is really wonderful."

"The mechanical work is the best we have ever seen; every section appears strictly tailored by skilled mechanics and really makes a wonderful showing."

"So much return from all parts of the house should give an evenness of temperature, circulation for cooling and heat distribution impossible to obtain in any system less carefully designed."

And, of course, there were endless questions about velocities, fan operation, control, humidity provision and control and other design and mechanical features.

Operating Data

To the automatic heating dealer the real proof of any system's satisfactory design and operation is in the fuel bill and the owner's acceptance. Therefore some gas costs may be interesting.

For the first six weeks (Oct. 15-Dec. 1) the total gas bill was $31.00. From December 1 to January 1 the bill was $32.00 (including a week of sub-zero). From January 1 to February 1 the bill was $23.80. The period February 1 to March 1 cost $21.20 (including three days of 11, 14 and 15 degrees below zero with a 33-mile wind and a week of 5 degrees above.

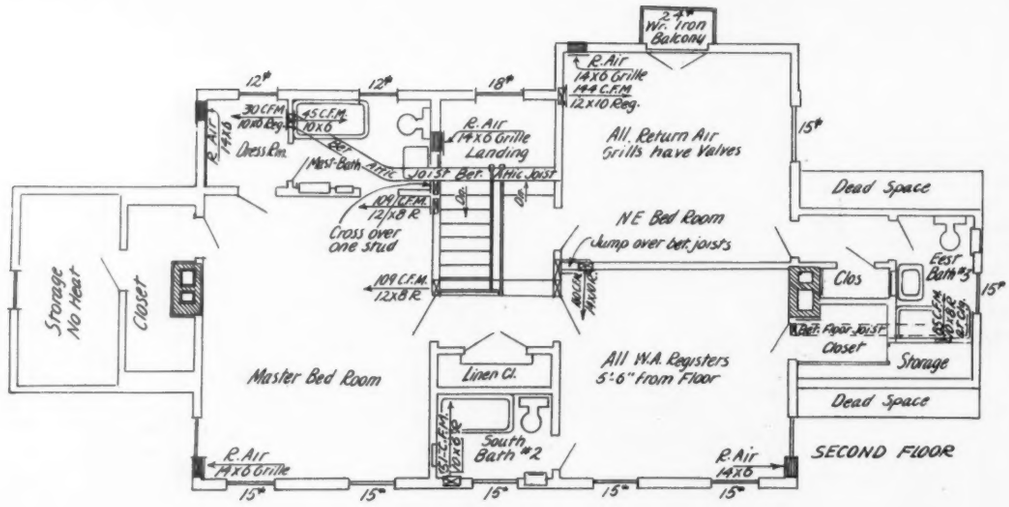
Design of the System

In connection with the design and installation of the system a number of interesting practices were followed. They account, in some measure, for the appearance, facility of installation and operation of the system. Here is how Arthur Hunt describes these sidelights:

"Upon arrival at the job, we looked up the plumber, introduced ourselves, stated that we had numerous pipes to be installed, and that we knew, also, that he had a number to install. We pointed out that

	ROOM DIMENSIONS	CUBICS	AIR CHS	INFILTRATION (1) B.T.U. (COL)	EXP. WALL	GLASS 1.13 B.T.U.	NET WALL .15 B.T.U.	EXP. FLOOR .26 B.T.U.	EXP. CLG. .20 B.T.U.	B.T.U. FOR 1ST T.D.	DES. TEMP.	B.T.U. SAF. FACTOR	TOTAL B.T.U.	VELOCITY C.F.M.
①	LIVING RM. 24'-10"x15'-6"x8½"	3104	2	0208 / 124	467	134 / 151	333 / 43	⌐	⌐	318	70	22240 / 10%	24486	302
②	HALL 20'x8'x8½"	1360	1	1360 / 27	68	32 / 36	36 / 5	⌐	⌐	70 / 68	70	9660 / ⌐	9660	120
③	DINING RM. 15½"x15'x8½"	2030	1½	3046 / 61	196	63 / 71	133 / 17	⌐	⌐	149	70	10430 / ⌐	10430	128
④	KITCHEN 9'-6"x12'x8½"	969	1	969 / 19	136	24 / 27	112 / 15	⌐	⌐	61	70	9270 / ⌐	6170	75
⑤	BRF. RM. 12'x6'x8½"	612	1	612 / 12	51	10 / 11	41 / 6	⌐	⌐	28	70	1960 / 10%	2156	26
⑥	ENTRY HALL 8'x5'x8½"	340	1	340 / 7	36	21 / 24	5 / 1	⌐	⌐	32	70	2240 / ⌐	2240	27
⑦	HALF BATH 4'x3'x7"	84	2	168 / 4	49	10 / 11	39 / 5	⌐	⌐	20	80	1600 / 10%	1760	22
⑧	MAIDS RM. 11'x8'x8½"	748	1½	1122 / 22	162	27 / 30	135 / 18	⌐	⌐	70	70	4900 / ⌐	4900	60
⑨	MAIDS BATH 6'x5'x8½"	255	1½	382 / 8	102	10 / 11	92 / 13	⌐	⌐	32	80	2560 / 10%	2816	35
㉑	MASTER BED 19'x15'x8'	2280	2	4560 / 91	272	60 / 68	210 / 27	⌐	285 / 57	243	70	17010 / 10%	18711	228
㉒	MASTER BATH 7½'x6'x8'	456	1	456 / 9	76	12 / 14	64 / 8	⌐	57 / 11	42	80	3360 / 10%	3696	45
㉓	MASTER DRESS 6'x6'x8'	288	1½	432 / 9	96	12 / 14	84 / 11	⌐	30 / 7	41	80	3280 / 10%	3608	44
㉔	HALL 11'x8'x8'	1024	1	1024 / 20	64	15 / 17	59 / 8	⌐	128 / 25	ADD TO 1ST F. HALL				
㉕	S.E. BED. 15'x14'x8'	1180	1½	2520 / 50	200	42 / 47	158 / 21	⌐	210 / 42	160	70	11200 / ⌐	11200	115
㉖	SO. BATH 8'x6'x8'	384	1	384 / 8	64	12 / 14	52 / 7	⌐	48 / 10	39	80	3120 / ⌐	3120	38
㉗	N.E. BED. 15'x14'x8'	1680	1½	2520 / 50	176	37 / 42	139 / 18	⌐	210 / 42	152	70	10640 / 10%	11704	141
㉘	EAST BATH 8'x7'x8'	448	1½	672 / 14	160	12 / 14	148 / 19	⌐ / .36	50 / 11	58	80	4600 / ⌐	4640	55
㉛	RECREATION 22'x14'x7½"	2310	2	4620 / 92	350	48 / 54	302 / 66	308 / 172	⌐	40" DIH. Wall and Floor		19740 / ⌐	19740	242
						K .22				384				
	TOTAL	20052				581	2142	308	1030	1967			139137	1703

Hunt Brothers believe in knowing all about the work they sell. This data sheet is a copy of their original showing the design calculations of the system and the close attention paid to the latest findings and recommendations of authorities. Note the increased temperatures for some rooms and the additional exposure percentages for doubtful rooms



Good distribution and collection, with the weight thrown to the north exposure (top of drawing) shows on the second floor plan. All inlets are 5 feet 6 inches above the floor, some supplied by attic branch runs

by close cooperation we could make the job easier on both of us, and do a good job at the same time. We asked him to go over the house with us, to make sure we did not have a stack planned where he had to occupy the space.

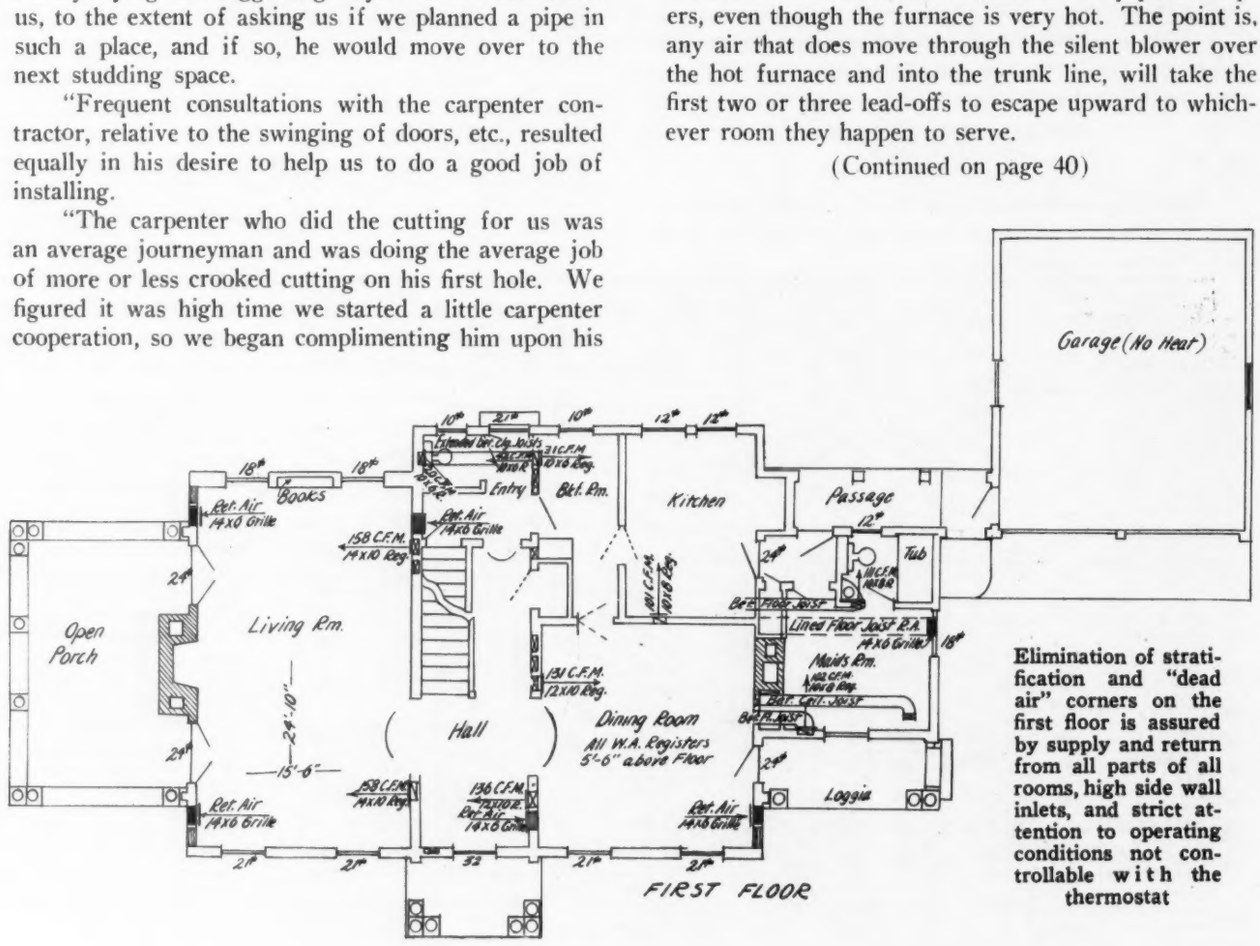
"In the very first room, we moved our location two studs away, in order to let his water pipes have a straight run. The psychology of the deal worked. He at once saw that we were anxious to help him and to make his work easier, setting aside any display of selfishness on our part. The result was, he was constantly trying and suggesting ways that he could favor us, to the extent of asking us if we planned a pipe in such a place, and if so, he would move over to the next studding space.

"Frequent consultations with the carpenter contractor, relative to the swinging of doors, etc., resulted equally in his desire to help us to do a good job of installing.

"The carpenter who did the cutting for us was an average journeyman and was doing the average job of more or less crooked cutting on his first hole. We figured it was high time we started a little carpenter cooperation, so we began complimenting him upon his ability to cut so straight, and wished he could cut the holes on all of our jobs. It worked again. The cutting was right on the line, and when we filled in around the stacks with asbestos to seal out the basement ceiling air, it was a small and neat job.

"There is nothing unusual about this job, but maybe one or two ideas can be passed along. One of these pertains to the movement of air through the system after the blower cuts off, which is done at the time the gas valve closes, to prevent overheating. We all know there is a small amount of air in motion after the blower is cut off, where there is no by-pass dampers, even though the furnace is very hot. The point is, any air that does move through the silent blower over the hot furnace and into the trunk line, will take the first two or three lead-offs to escape upward to whichever room they happen to serve.

(Continued on page 40)



Elimination of stratification and "dead air" corners on the first floor is assured by supply and return from all parts of all rooms, high side wall inlets, and strict attention to operating conditions not controllable with the thermostat

Principles of Humidification

By Malcolm Tomlinson

This article on testing concludes Mr. Tomlinson's series on humidification. Many new charts and tables, exclusive with this series, have been presented and much of the material has appeared for the first time. Although the series is finished, Mr. Tomlinson will gladly answer questions. Read the series through again—then send in your questions or problems.

✦ ✦ ✦

TO investigate atmospheric conditions in a building, to check the performance of humidifying or air conditioning equipment, to measure the outside "weather" or to obtain information for comfort work it is necessary to determine the relative humidity. If for no other reason than self protection, every one engaged in the application of air conditioning must face this fact.

Actually, there is nothing about such measurements which need alarm anyone. The process is very simple and easily learned. At the same time there is a "but" in these determinations just as there is a "but" in the process of laying out sheet metal work for a cornice. If the few fundamental requirements for correct relative humidity readings are neglected the results obtained will fool you every time. No one can afford to be placed in this position.

One of the best known methods of obtaining the relative humidity is to measure the dry and wet bulb temperatures. A psychrometric chart or table is then used to find the relative humidity which corresponds to the two temperatures. A variation of this procedure is to subtract the wet bulb reading from the dry bulb in order to secure the wet bulb depression in degrees Fahrenheit. The relative humidity is then found on a chart or table which shows the relative humidities for various combinations of the wet bulb depression and the dry bulb. A chart of the latter sort is shown in Fig. 1.

The wet bulb depression is, then, a *difference* in temperature between the dry and wet bulbs. Once it is obtained, by subtraction, the relative humidity is found on Fig. 1 by locating the intersection of the vertical dry bulb line with the horizontal wet bulb depression line. If the relative humidity curve does not pass through this intersection it is easy enough to estimate the actual relative humidity from the nearest relative humidity lines.

For example, take a dry bulb of 85 deg. and a 2.5 deg. wet bulb depression. At the intersection of the 90 deg. and the 2.5 deg. lines it will be found that the 90 per cent relative humidity line also intersects the same point. Therefore the relative humidity obtained by the readings is 90 per cent *provided* the methods employed in the observation are correct. It is well to remember that a small wet bulb depression indicates a high relative humidity while a large depression is a sure sign that the air is quite dry and also that the relative humidity is low.

Make Your Own Wet Bulb

It is evident that the wet bulb temperature can be measured by an ordinary thermometer. All that is needed is a silk or cotton covering (wick) for the thermometer bulb, a vessel filled with water and a means by which the air can be moved past the wet bulb at a fixed speed or velocity. The wick is drawn up tight over the bulb and its free end rests in the water. By siphonic action the water will rise through the wick and form a thin film of moisture round the bulb. Every sheet metal worker understands this action for one of the main purposes of good roofing is to prevent creepage, or siphonic action, of water. As long as the vessel contains water siphonic action continues *provided* the wick is not clogged by an accumulation of dust from the air or salts and dirt from the water. Wicks cost very little and can be made from clean knit cotton cloth. It will pay to change these wicks every day and thus keep them clean.

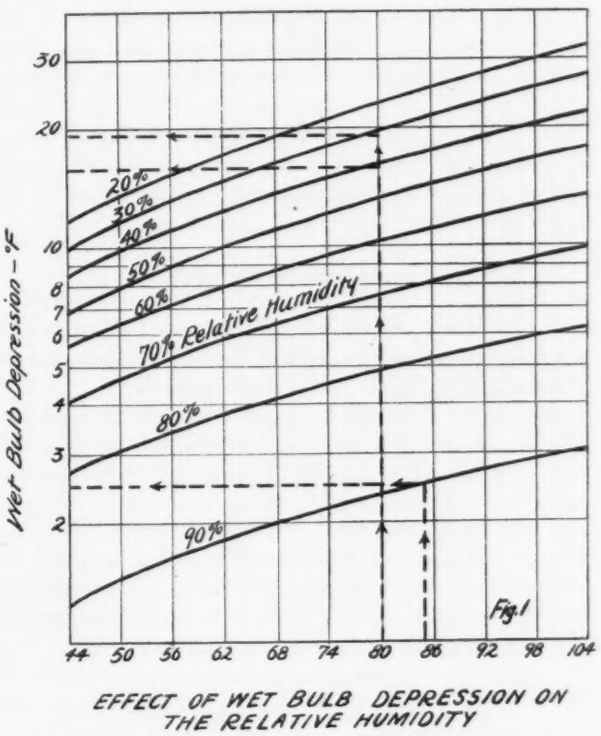


Fig. 1. As the air becomes "drier" the wet bulb depression increases but the wet bulb temperature decreases

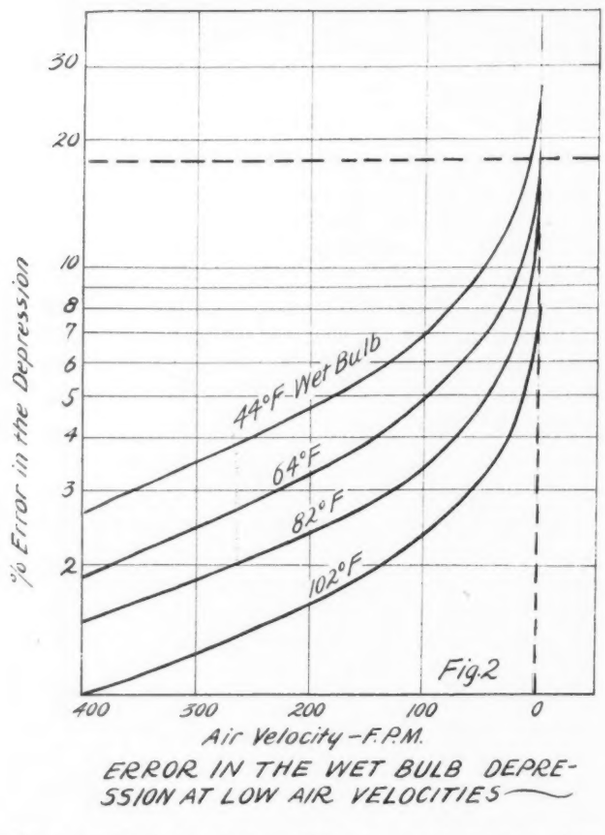


Fig. 2. Still air is a bad condition for wet bulb determinations. This chart makes corrections possible

For a true concept of the wet bulb it is necessary to turn to the process of evaporation. Air in contact with water may become saturated by vaporization which proceeds on the surface of the water. In other words, a small quantity of the water may be changing into water vapor without anyone being aware of the fact. If no heat is applied for evaporation purposes, through outside means (furnace, boiler, stove, radiator, etc.), it must be provided by the air. For, without heat, there can be no evaporation. As the air gives up heat and evaporation proceeds, the water vapor mixed with the air increases and the quantity of liquid water diminishes.

Importance of Net Bulb

But, when the air becomes saturated there can be no more evaporation. In fact the evaporation process gradually slows up as the relative humidity of the surrounding air increases. Therefore a relative humidity of 100 per cent is a sure sign that there is no evaporation. At this point the dry bulb and wet bulb temperatures are exactly equal. Here we have the reason why the wet bulb temperature is known as the "temperature of evaporation"—because it is a true indicator of the state of the evaporation process. This peculiar characteristic of the wet bulb provides the means for the determination of the relative humidity.

Take the time to examine the records of the U. S. Weather Bureau on the relative humidity. It may surprise you to learn that it is almost impossible to find a record of 100 per cent relative humidity and that 95 per cent seldom occurs. Except on the coasts of Maine and California, six dense fogs a year is most unusual. This fact is mainly due to the decrease in evaporation with the increase in the relative humidity. Evaporation, then, indicates a change of state of the surrounding atmosphere. The characteristic sign of this state is the gradual approach of the wet bulb to the dry bulb temperature.

In the preceding article an increase in the air velocity was shown to cause an increase in evaporation. Such action is natural, for moving air drives the water vapor off surfaces from which it has just evaporated. The dispersal provides room for additional water vapor. For the same reason air motion plays an important part in the measurement of the wet bulb. Research has proved that the observed wet bulb temperature is in error when the air movement past the wet bulb thermometer is less than 3,000 feet per minute. Since this error is quite small, for high velocities, it is considered good practice to use an air speed of 900 feet per minute in wet bulb determinations. The effect of still air and of low air velocities on the wet bulb error is given in Fig. 2.

A Typical Example

The significance of the wet bulb error can be seen by an example. Take a dry bulb temperature of 80 deg. and still air. Suppose the wet bulb, under these conditions, measures 64 deg. The depression is, apparently, 16 degrees. Reference to Fig. 1 indicates that the relative humidity for this atmosphere is 41 per cent. But, from Fig. 2, an air velocity of 0 feet per minute and a wet bulb of 64 deg. gives an error of 18 per cent. If this is true, and it has been proved through research, the wet bulb depression actually is:

$$\frac{16 \times 100}{100 - 18} \text{ or } 19.5 \text{ deg.}$$

With Fig. 1 it will be seen that this corrected depression, for a dry bulb of 80 deg., gives a relative humidity of 30.8 per cent. Thus an error of only 18 per cent in the wet bulb depression has lead to an error of 33 per cent in the relative humidity. Working between a minimum of 30 per cent and a maximum of 40 per cent in the relative humidity does not permit of an error of this amount in the relative humidity.

Measuring Instruments

The most common form of psychrometer, or instrument for measuring the relative humidity by means of the wet and dry bulb temperatures, consists of two thermometers mounted on a vertical support. One thermometer bulb is provided with a wick. A small bottle filled with water supplies moisture for the wick. This instrument is not satisfactory for commercial purposes unless some means is available for obtaining the rate of air movement at the time the temperatures are read.

A most ingenious instrument for the same purpose is the well known sling psychrometer. It is supplied with the same equipment noted above but is also designed so that it can be revolved, or slung, through the air. The rate should move air past the wet bulb at

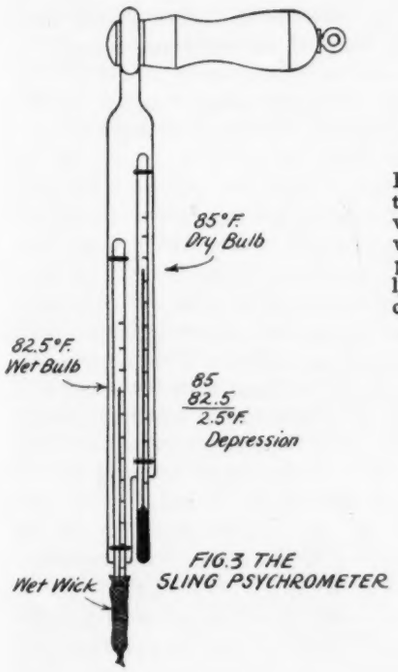


Fig. 3. With care this instrument will measure the wet bulb temperature correctly. Read what care means in this case

900 feet per minute. Before slinging the wick must be moistened. This type of instrument is superior to the one previously described, but it also has serious disadvantages. The wick must not become dry. The rate of slinging must give 900 feet per minute of air motion past the wet bulb. The wet bulb must be read the instant the instrument stops revolving or the wet bulb temperature will rise. Also the slinging may be stopped before the wet bulb has dropped to the true wet bulb.

The sling psychrometer which we have described is shown in Fig. 3. A variation of this psychrometer uses only the wet bulb thermometer as in Fig. 4. This latter instrument, when revolved, has the same disadvantages characteristic of the psychrometers described, but is less expensive. After slinging, the wet bulb temperature is read, the wick is slipped off and the dry bulb temperature is then read after the mercury has ceased rising. A chart attached to the support makes it possible to immediately determine the relative humidity.

The disadvantages of the sling psychrometer are numerous, but they can be overcome by practice and care. If the tip of the wet bulb is 12 inches from the handle, for example, the number of revolutions per minute which will give an air speed of 900 feet per minute past the bulb are: $\frac{900}{2 \times 1 \times 3.14} = 143$ or more than two revolutions per second. Faster slinging can do no harm but slower slinging is not advisable. It takes patience and practice to obtain good results with the sling psychrometer. Through a long experience the writer has found few people who have become skillful with this psychrometer.

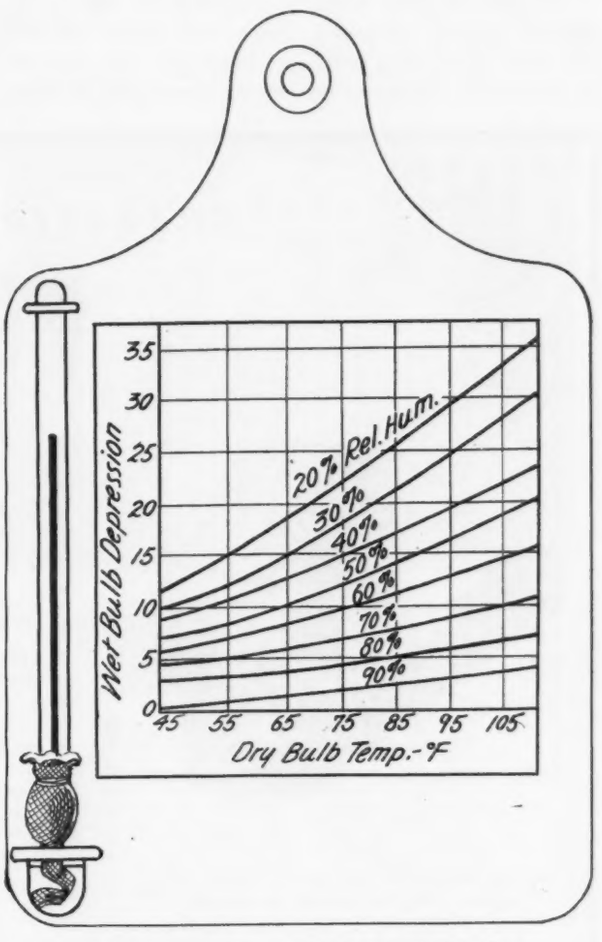
Accuracy Needs Air Motion

The whole problem of wet bulb determinations can be overcome by use of the forced air type of psychrometer which is rapidly finding favor in air conditioning work. It is similar to the sling psychrometer except that no means are provided for slinging. A motor driven fan is fastened to the frame in such a manner that air can be sucked past the wet bulb thermometer at the correct velocity. Of course it would not do to blow air from the fan over the thermometer bulb since such air would carry heat from the motor to the bulb. Thus the only problem which remains of those noted previously is that the wick must be kept moist. One important advantage of this type of instrument is that readings can be taken with the fan in operation.

Any shop can build a psychrometer of the forced air type. A wooden or sheet metal base will serve as a support. An inexpensive form of motor driven disk fan will answer the purpose. Even the fan blade can be made in a sheet metal shop. Two precautions are necessary. One is to arrange the fan so that the air is pulled past the wet bulb. The other is that the motor which drives the fan have the right voltage, phase and current for the territory in which the psychrometer is to be used. Generally 110 volts, single phase and alternating current is satisfactory for small motor driven fans. It is possible to even use a sturdy type of toy motor and make the blades of a piece of sheet metal.

More expensive types of psychrometers are available for indicating and recording purposes. One type, which measures the relative humidity directly, is oper-

(Continued on page 41)



PORTABLE PSYCHROMETER

Fig. 4. Even this little instrument will measure the wet bulb correctly when slung

Comfort Cooling

(*Continued from page* 31)

degrees. The cross sectional area of the washer will be

$$790 \div 400 = 1.98 \text{ sq. ft.}$$

and the number of sprays will be

$$1.98 \div 0.8 = 2.48$$

very nearly and at least 3 should be installed. The pressure of the water at the nozzle will be approximately 5 pounds per square inch per gallon per nozzle per minute, so for 2 nozzles 7½ lb. will be needed.

Cooling Coils

If cooling coils are used, the type usually chosen is copper, although aluminum and steel are also made use of. The coils may be smooth or made with fins, and, as the metal wall of the pipe frequently is quite thin, the use of fins materially strengthens the pipe. The amount of pipe required depends on the load and has to be calculated from the usual formula:

Heat absorbed per hr. = area of outside surface in sq. ft. × coefficient × the temp. diff.

Taking the average temperature difference as 10 deg. F. and the coefficient of heat transfer at 5.0, the area of the coils becomes:

$$21{,}324 = \text{area} \times 5.0 \times 10$$

Therefore the area is:

$$21{,}324 \div 50 \text{ or } 426 \text{ sq. ft.}$$

In the research house a total cooling surface of 473 sq. ft. was provided, which was ample for the purpose. However, with ice water the temperature difference on the two sides of the heat transfer surface would be greater. We should also remember that the total load on the comfort cooling plant during the period of research rose to a maximum of over 24,000 B.t.u. On the basis of a maximum load of 24,220 B.t.u. per hour the cooling surface calculates to be:

$$24{,}220 = \text{area} \times 5.0 \times 10$$

or the area is:

$$24{,}220 \div 50 = 484 \text{ sq. ft.}$$

which would be a size that undoubtedly would be nearer the amount to install.

It is worth while mentioning that the coefficient of heat transfer (k) varies with the velocity of both the water and the gas being cooled. If either velocity is very low, the coefficient of heat transfer drops off.

If the air in the residence at the breathing line is 80 degrees dry bulb, and the sprays or the cooling coils will cool the air to a dew point temperature of 60°, corresponding to 77 grains of water vapor per pound of bone dry air, the relative humidity in the house will be very nearly 50 per cent. If the moisture content of the air increases to 55 per cent, corresponding to 85.8 grains of water vapor, moisture will begin to condense at about 62.9 deg. F. and the moisture content will be 77 grains when the air temperature has been lowered to 60°.

By circulating the air of the house through the cooling coils or the sprays so as to condense out the excess water vapor, the humidity will be maintained at 77 grains per pound of bone dry air, or at approximately 50 per cent humidity at the desired dry bulb temperature of 80 degrees. Should it be desired to bring fresh air into the house, other than that which

enters by infiltration or otherwise, the best manner would be to enter it through the cooling coils or the spray chamber where the excess moisture in the water vapor will be deposited immediately.

Comfort cooling with water is the simplest method by far of any of the four common devices which have been used to any extent. Control should consist of a thermal device operating the water valve. This can be by means of a bulb containing a volatile liquid like sulphur dioxide connected by a tubing to a diaphragm under the pressure of a control spring. As the temperature rises above a set point the liquid compresses the spring and the valve is opened to admit more water. Unless the water is initially colder than 55 degrees it does not seem that a damper and by-pass is particularly desirable.

Conclusion

The research residence at the University of Illinois has a calculated sensible heat loss of 17,059 B.t.u. per hour on the basis of 10 deg. F. difference of temperature. To this must be added a latent heat equal to 4,265 B.t.u. per hour estimated from the tests of 1932 as the equivalent of the dehumidification.

With 55 degree water, and an allowable rise of temperature of 10 degrees, the amount of water required becomes:

$$\frac{17{,}059 + 4{,}265}{10} = 2{,}132 \text{ lb. per hour}$$

$$= 256 \text{ lb. per minute}$$

$$= 4.26 \text{ gal. per minute}$$

The hourly load may be much greater and equal to 24,200 B.t.u., in which case the water rate will be:

$$24{,}200 \div (10 \times 60 \times 8.33) = 4.8 \text{ gal. per min.}$$

If sprays are to be used, at least three are required and four will be better. The amount of air to be moved will be figured from the sensible heat, assuming the specific heat of air as 0.24 and the drop of temperature to be $80 - 60 = 20$ deg. F. Or:

$$\frac{17{,}059}{20 \times 0.24} = 3{,}554 \text{ lb. per hr.}$$

$$= 59.2 \text{ lb. per min.}$$

$$= 790 \text{ cu. ft. of air per min. at 60 deg. F.}$$

The coil surface is:

$$21{,}324 = \text{area} \times k \times (t_2 - t_1)$$

$$\text{Area} = \frac{21{,}324}{50} = 426 \text{ sq. ft.}$$

where $(t_2 - t_1) = 10$

$k = 5.0$

But probably 500 sq. ft. would be needed to take the heavy over-load during certain periods of the day.

The surface used for comfort cooling will have fins, and the area in the calculation will include the outside area of the tube and both sides of the fins.

Cost

The cost of the tube surface will be about $200, the casing and piping an additional $100 and the automatic valve about $25. It is assumed that the furnace already has a motor driven circulating fan.

Hunt Job (*Continued from page* 34)

"The room containing the thermostat should not be one of these favored leads. Also if possible, these first 'breather' rooms should be rooms exposed to the prevailing winds, that we may continue to deliver air under gravity. In this job, one of the runs to the Master's bed room, which is on the north and west, leaves the trunk very close to the furnace, and rises straight to the attic 17 feet 6 inches, crosses over between attic joist 8 feet 6 inches, and then down 2 feet 6 inches to the register, forming such a 'flue' effect that it is hard to tell when the blower is not running.

"The large southeast bed room is favored in like manner, with the dining room also being a favorite. In this house when the thermostat which is located in the center hall, calls for heat, the rest of the house has cooled down accordingly.

"The velocities on this job were figured at a maximum of 800 feet in trunks, 500 feet in stacks, and 300 feet at registers. We used 3½ by 10-inch, 3½ by 12-inch, and 3½ by 13-inch stacks, and in most cases, these sizes were larger than the 500 feet velocity demanded, thereby reducing some to as low as 300 feet velocity.

"We have come to the conclusion that it is advisable to stay away from stacks full 14 inches wide, as the basement joist may cause troubles. Use 13½ inches or 13 inches and let the velocity be a little higher.

"Our stacks were all single galvanized iron covered with one coat of asbestos paper and joined with the well known drive cleat and "S" hook. All basement ducts are free from asbestos paper, and have one coat of buff, heat resisting enamel, leading from the red crystal painted trimmed in black casing of the Sunbeam Gas Automatic Air Conditioning unit.

Operating Cycle

"The operating cycle is as follows: the thermostat calls for heat. When the casing temperature reaches 125 degrees, the blower starts, drawing the air through the glass filters. As the blower makes contact, it also furnishes current to the humidistat located three inches from the thermostat. If the relative humidity is below the pre-determined setting, the current opens the solenoid valve, which throws a forceful spray against a marble plate, making the finest of mist which is hurriedly carried from the plenum chamber to every room in the house, and when the humidistat is satisfied it cuts off until more humidity is needed. The mist cannot be had as long as the blower is not in operation. As stated before, the blower stops with the gas burner. The three pilots are in one series, and should any one of the three go out, 28 seconds later the entire plant is cut off until the pilots are lighted.

"Three piece registerers were used and placed 5 feet 6 inches up from the floor. In order to control the air pick up in summer circulation, the eleven return air grilles are one piece, warm air registers, with louvres.

"The outside walls were insulated with one inch of Rokflos, a recent development in the way of insulation, which comes in rolls like balsam wool. Between the second floor ceiling joists, two inches of Rokflos was unrolled."

Humidity

[Continued from page 37]

ated by means of a material which is affected by the relative humidity and transmits its own expansion or contraction through a series of levers. Another form consists of an expanding liquid type of thermometer. A third form depends on the principal of the electric pyrometer. The two latter types of thermometers are encased in metal sheaths and the wet bulbs are supplied with large wicks and water reservoirs.

In every case the instrument provided for relative humidity determinations requires not only care in upkeep but also an understanding of those factors which, if neglected, will destroy the reliability of readings. From the evidence presented it is certain that the stationary types of hygrometers and psychrometers have large errors. Such errors may be overcome by sling instruments but which can be practically eliminated by the forced air types of psychrometers.

Frankly the first equipment needs for air conditioning work cover two items. A psychrometric chart suitable for comfort work and an instrument for measuring the wet and dry bulb or the relative humidity. The information obtained by outside and inside determinations of the dry bulb and the relative humidity is priceless because it is practical data. Reliable instruments for such measurements are by no means expensive. Why use instruments which give serious errors?

✦ ✦ ✦

Air Conditioning's Future

Thomas Torr

Air conditioning has opened the gate to profits for the furnace dealer, plumber, tinner, sheet metal worker, hardware store, steam fitter or anyone qualified to merchandise heating or ventilating equipment unequalled since warm air furnaces themselves were born.

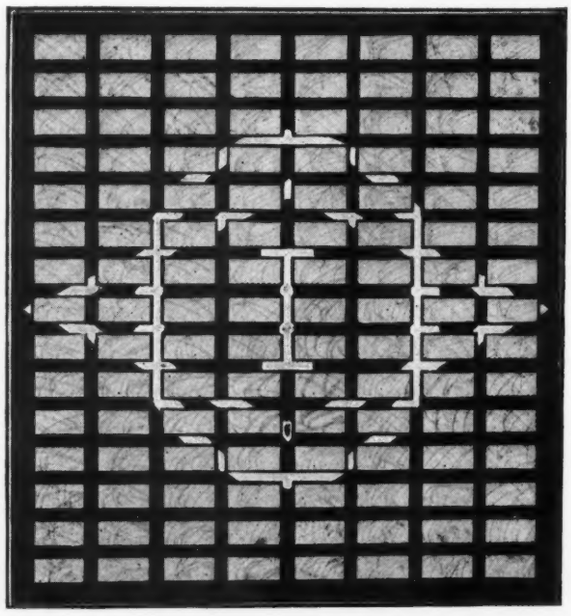
Air conditioning's potential market is claimed to be more than $5,000,000,000. If 50 percent of all homes in this country were counted, more than 10,000,000 would be the answer. Within 10 years, many experts believe, most homes will have had some form of air conditioning installed.

We have seen the birth of radios, electric refrigerators, automobiles, electric lights and telephones. The future for air conditioning now is what the future was for those great inventions when they were first made practical.

Before long all theater, office buildings, churches, trains, ocean liners, schools, hotels, apartment houses and public buildings will be equipped with air conditioning. The next step in the march of conditioning progress is widespread use of it in private homes and small buildings of all types.

Many so-called conditioners are on the market today which will not deliver fundamental services of true air conditioning. Excellent conditioners, however, are available. Changes undoubtedly will be made in most present air conditioning equipment for homes. Nothing man makes is absolutely perfect.

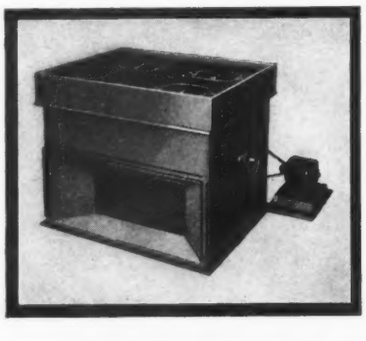
Engineers developing home air conditioning equipment, have had several factors to consider that designers of conditioning equipment for commercial uses had not to eye so closely. First, the size of the unit had to be kept relatively small. It had to be moderately priced. It had to be economical in operation, requiring little or no mechanical knowledge by the purchaser to give operating satisfaction. And it had to perform services claimed.



Dustop Stopped *the Show at Syracuse*

● Conclusive proof of Dustop Air Filters' acceptance among furnace manufacturers was evidenced at the 10th Annual Convention of New York State Sheet Metal Contractors Association last month in Syracuse.

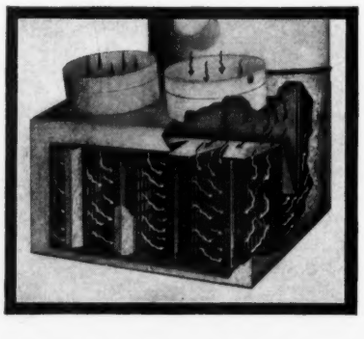
Every manufacturer of warm air furnaces who exhibited showed Dustop-equipped installations. Such sweeping testimony cannot be ignored. It shows that these representative leaders in their field know that Dustop Glass Wool Filters will do the best air cleaning job on their equipment at the lowest cost to both manufacturer and user. Owens-Illinois Glass Company, Toledo, Ohio. (Dustop is assembled and installed in Canada by General Steel Wares, Ltd., Toronto, Canada.)



● A typical Dustop installation on blower for warm air furnace.

● Exhibitors at N.Y. State Convention of Sheet Metal Contractors Association whose furnaces were Dustop-equipped:

- INTERNATIONAL HEATER COMPANY
  Syracuse, New York
- FOLLANSBEE BROS. COMPANY
  Rochester, New York
- RICHARDSON BOYNTON COMPANY
  New York, New York
- KELSEY HEATING COMPANY
  Syracuse, New York
- LENNOX FURNACE COMPANY
  Syracuse, New York



● Dustop filters installed on a typical gravity warm air furnace.

DUSTOP
·Stops Dust·

OWENS-ILLINOIS

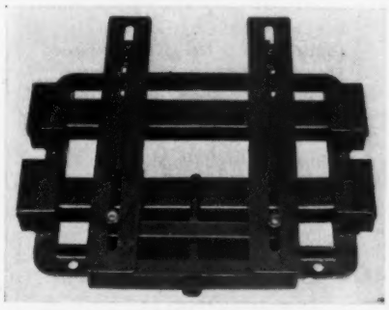
Air Filters

1873 · SIXTIETH ANNIVERSARY · 1933

New PRODUCTS

Sound-Isolating Base

A new motor base with scientifically designed sound-isolating features has been developed by the General Electric Company. Floating members are suspended on specially developed isolating material, enclosed and mounted for long life and freedom from damage. The motor is mounted as on a standard sliding base, and belt ten-



sion and motor alignment are maintained in the ordinary manner.

In addition to its sound-isolating qualities, the new base offers the following advantages for facilitating installation and contributing to successful operation:

1. Adjusting screw moves motor for belt adjustment.
2. Bases are installed as a unit.
3. The stiffness of the sound-isolating material is sufficient to maintain motor alignment for any reasonable belt tension.
4. Guide washers in machined grooves are used with the belt-adjusting feature to maintain motor alignment.

◆

Chrome Nickel Sheeting

The American Nickeloid Co., Peru, Ill., announce a new sheet supplied in any standard gauge and size up to 36 by 96 inches and in either bright polish or satin finish.

This new sheet is made by bonding a high grade nickel silver sheet to chromium by a special process making a sheet possessing the qualities of both materials.

The outstanding characteristics of the new material are—it is white metal all the way through; it is rust proof; it is resistant to tarnish and discoloration; it resists most acids and alkalis; it is easily workable; it requires no polishing, plating or lacquering; it wears well; it is lower in cost than many other alloys.

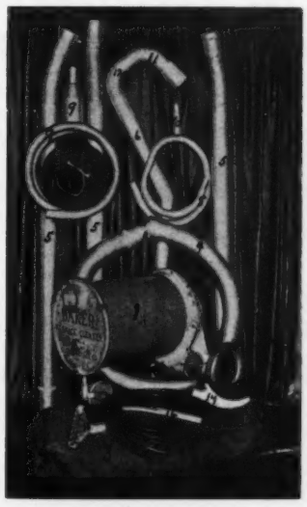
Complete information and prices can be obtained from the company at Peru, Ill.

◆

Furnace Cleaner

Several improvements and a more complete line of accessories are announced by the Baker Furnace and Cleaner Manufacturing Co., Toledo, Ohio, for their 1933 model furnace cleaner. The accessories have been designed and are furnished in order that the mechanic can perform every necessary cleaning operation with a suitable tool which reduces time and saves labor.

In addition, the Baker company has prepared a set of instructions which



are so detailed that even mechanics who have never used a vacuum cleaner can clean a furnace or boiler in a satisfactory manner.

Full information on the cleaner and about the instruction set can be obtained from the company at 2505 Albion St., Toledo.

◆

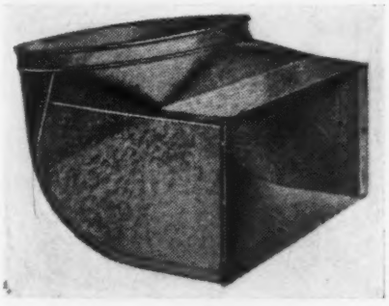
Improved Heat Booster

An improved heat booster, quieter in operation, with a new long life motor, totally sealed outboard bearings, permanently oiled is announced by the Forct Air Co., Rockford, Ill.

Among the features are—no moving parts exposed and a motor designed particularly for high temperatures, even where oil burners are used.

Frictionless Shoe

The Bergstrom Manufacturing Co., Milwaukee, Wis., announces a new frictionless cold air shoe of such construction that there are no corners or sharp angles to impede air flow and



form air pockets at the point where even distribution and smooth flow into the casing are essential. The company claims that the design employed increases the efficiency of air flow through the shoe.

The shoe will be made in all standard sizes and will be sold at prices competitive with all other types of shoe. Full information can be secured from the Bergstrom company.

◆

New Line of Furnace Bonnets

A complete line of made-up and knocked-down furnace bonnets and a line of frictionless T's have been added to the group of materials of the Milcor Steel Heating Division.

The bonnets are made in two general styles—Style "K" with inverted cone top and Style "L" with flat top. Special seams provide unusual strength and tight fitting qualities. The knocked-down feature permits a low freight rate and saves space while in stock. The design of this bonnet permits it to be assembled in one minute and yet fit as tightly as if it were shipped made up.

The T-joint is said to give equal draft in each pipe and eliminates right angles.

The Milcor Steel Company has prepared a folder describing these new products and will be glad to forward information on prices upon request. Address: Advertising Division, Milcor Steel Company, South 41st and West Burnham Streets, Milwaukee, Wisconsin.

Beading Machine

A new beading and trimming machine designed to cut costs in producing drawn shells of almost any shape is announced by the McKinney Tool & Mfg. Co., Cleveland.

The machine operates as follows: The handle seen at the extreme upper right of the machine operates the saddle carrying the front vertical roll. When this lever is pulled forward the rolls are separated. The part to be trimmed or beaded is then set on the

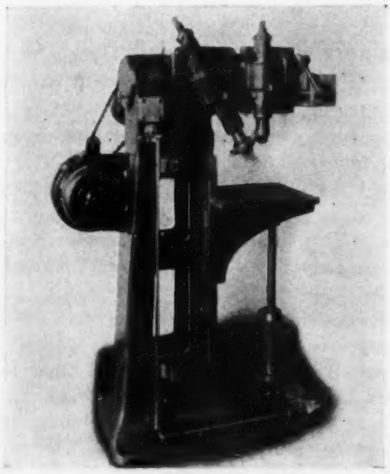


table which has previously been set at the proper height. The lever is then pushed back bringing the rolls together. The cut starts immediately and work revolves on the table until the cut is complete. The operation is then repeated.

The rolls can be run at a speed of 40 to 60 revolutions per minute for beading stock up to 18 gauge or for trimming stock up to 16 gauge. The machine is easily started and stopped with the foot treadle operated clutch. The drive is from a motor mounted on the machine and is through V belts or silent chain.

◆

New Conditioner

A new air conditioner, consisting of a blower, filters, and an automatic humidifier, all housed in one cabinet designed for connection with a furnace is announced by the Liberty Furnace Co., St. Louis, Mo.

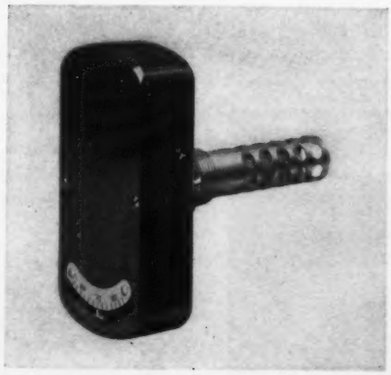
The unit will be manufactured in two sizes—a Junior, suitable for small houses and a Senior, suitable for houses up to 12 rooms. Blower capacities wil range from 500 to 1,500 C. F. M. at ⅛-inch static pressure.

Four sections of filter are used in both units. The humidifier is fully automatic and is controlled by a factory set controller. The finish will be red lacquer with black trim.

Full information can be obtained from the company.

Thermostat for Water Vapor

A three wire, low voltage, duct type thermostat that will not corrode and consequently may be used where ex-



posed to water vapor has recently been introduced by Barber-Colman Company, Rockford, Illinois. All parts of the instrument which are exposed to the vapor are made of phosphor bronze with the exception of the sensitive element which is of bimetal. Models are now available in the standard ranges. In general appearance this new instrument resembles the regular Barber-Colman duct thermostat.

◆

Hess Low Priced Furnace

A new welded steel furnace, designed along proved Hess lines and priced to sell at prices competitive with today's market, is announced by the Hess Warming & Ventilating Co., 1201 South Western Ave., Chicago.

This new furnace, known as the

Benefactor, will be the price leader of the Hess line. The furnace is gas tight, obtained by a welded steel body. Standard casing is square as shown in the illustration.

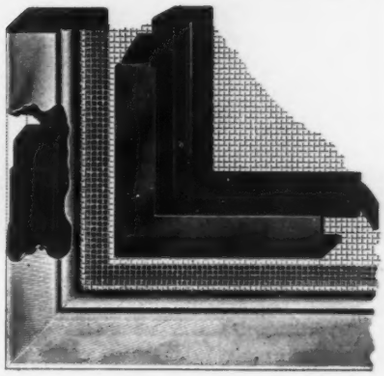
Descriptive literature has been prepared by the manufacturer and with complete prices may be obtained by addressing the Hess company.

Metal Screen Frame

The Universal Frame Co., 2141 Humboldt Blvd., Chicago, is marketing a new item for the home owner—an all metal window screen composed of standardized parts which can be purchased in strip and manufactured into any size frames by the sheet metal contractor.

The frame which holds the screen consists of specially formed pieces of electro galvanized steel so formed (as shown in the sketch) that the frame sides can be put together by mitering the corners and inserting a special slip corner bracket.

The frame sides have a special channel into which the screening is laid and held by a spring section which holds the screening under tension.



In order to help contractors sell this item the company has made up small sample windows with a screen in place in the guides which are part of the screen. This sample will give an actual demonstration. The frames are low enough in price to compete in the market with less substantial frames.

Full information on prices, sizes, and sales possibilities can be obtained from the company.

◆

New Whitney Products

A new brake, said to be two machines in one and a new punch and die holder are announced by the Whitney Metal Tool Company, Rockford, Ill.

The brake can be used as a bending brake or a pan brake by utilizing box fingers and making some minor adjustments requiring about fifteen minutes. The brake operates reverse from other machines in that the platen against which the material is held is stationary while the lower portion slides on two end posts. Accurate bends is claimed for this feature.

The punch and die holder is designed to adapt the regular Whitney stock punches and dies for power press use.

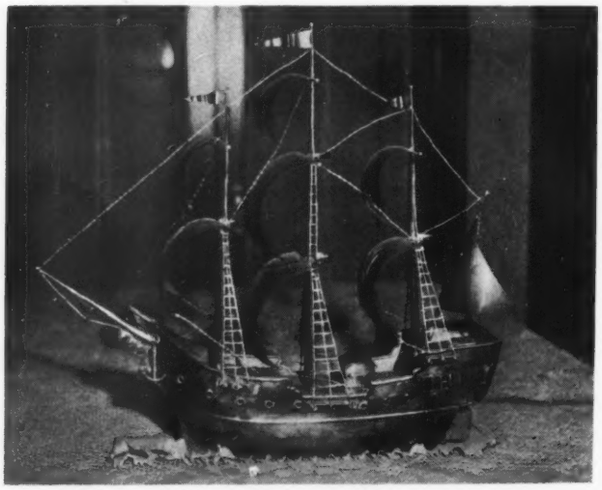
Literature describing these new products can be obtained from the company.

With Our Readers . . . . . .

A Ship Made of Metal

An interesting and unusual example of sheet metal craftsmanship is the all-metal "Treasure Ship" illustrated herewith.

It represents a pirate ship of early Spanish pattern, and is an original design worked out by Jack Wood, of J. Wood



& Co., 16354 Euclid avenue, Cleveland, Ohio, who conducts a sheet metal and furnace shop at that address.

The ship is an all handwork job by Mr. Wood.

Used as a window display the ship attracted much attention and several inquiries as to whether or not it was for sale, one admirer offering as high as $65.00 for it.

The ship is 18 inches long, 5 inches wide and 20 inches high. The hull is of copper, the sails nickel-silver, and the ropes and ladders are made from picture wire. The rear sail is embellished with a Spanish cross in brass, while the sail at the front (not nautical) bears the so-called Columbus cross.

The interior of the hull is illuminated by electric light made possible by a clever job of wiring.

Mr. Wood states that he has patterns for the model and that he would be glad to furnish them to fellow craftsmen at a very nominal cost.

✦

Business Picking Up

A reader in making an extensive business trip within the last two weeks covering parts of several midwestern and north central states brings back the encouraging news that business in this section is showing signs of pickup.

Eastern Minnesota shows considerable residential building in many communities particularly small homes selling from $3,000 up. This increase is not great in comparison to boom times but shows a pronounced increase over the last two years.

Eastern South Dakota shows some gains in retail business although the construction field is still quiet.

Northeastern Iowa also shows pickup in retail business in many communities but the building business has not increased in proportion. However people are beginning to spend money.

Eastern Nebraska is witnessing increased prices for farm products which is increasing retail business and this, in turn, is stimulating some building.

News Items . . . . . .

Sinker-Davis Buys Fire-King

The Sinker-Davis Co., Indianapolis, Ind., announces that it has purchased all of the property and assets of the Fire-King Stoker Company.

The Fire-King Stoker will be built in the same plant where its manufacture was originally commenced in 1925 and will be distributed direct to dealers.

Fire-King thus inherits the full benefit of Sinker-Davis' 82 years' experience as machinery designers and builders.

The company announces a complete new line of Fire-King models starting with three small sizes suitable for domestic purposes and completing the line with the larger sizes of industrial stokers. They are also prepared to supply promptly any and all parts for any Fire-King stokers.

Descriptive literature of the New Fire-King stoker models is ready for distribution and may be secured from the new company.

◆

Kansas Anti-Utility Merchandising Law

Efforts to repeal the anti-utility merchandising law of Kansas have recently been defeated by the legislature of that state. Two repealing measures were introduced. One was voted upon by the senate and killed by a large majority. The other was turned down by a house committee. One large utility company has resisted the Kansas law, carrying its opposition to the courts. The utility has lost the case in lower courts, and the Kansas Supreme Court, after holding hearings, is now preparing its decision.

◆

Republic Steel District Office Moved

The Dallas, Texas, District Sales Office of Republic Steel Corporation has been closed and removed to 2322 Gulf Building, Houston, Texas, N. J. Clarke, Vice-President in Charge of Sales, announced recently. R. E. Lanier, District Sales Manager, and his present staff will be in charge of the new Houston office.

◆

Michigan State College Short Course

We are in receipt of the following report from the engineering course recently given by Michigan State College at East Lansing, Mich.:

"The Course was not quite as well attended as last year, which of course under the present economic conditions could hardly be expected. There were about twenty men from the previous course who came back. There were others who would have been here but business conditions made it necessary that they be elsewhere. There were about forty-five or fifty, all told, in attendance this year against last year's attendance of about seventy.

"Every subject treated on the program was very outstandingly put across by the various individuals. Some of the very outstanding subjects were 'Fan Characteristics' by S. H. Downs; 'Velocities and Temperatures at the Register' by J. H. VanAlsburg; 'Controls' by A. C. Grant, and 'Computing the Cooling Load' by D. A. Newton of Detroit."

◆

Stoker Display in Drug Store Window

A dealer for the Iron Fireman Manufacturing Co. at Marseilles, Illinois, recently used a very effective display of a household size stoker in a local drug store window. While the display was on, the dealer spent each afternoon and each evening at the store making contacts. While no direct sales were made during the showing, the dealer obtained many prospects and believes that the display will pay good dividends.

News Items . . . . . .

Charles J. Biek Dies

The sudden death of Charles J. Biek, vice president and general manager of the Rudy Furnace Company, resulting from a heart attack, occurred March 24 in Dowagiac. He was 41 years of age.

While his health had not been too rugged in recent months, he was active in business and personal pursuits.

Mr. Biek was one of the outstanding figures in the furnace industry rising to the general managership of one of the largest firms in the industry.

Charles J. Biek, son of Mr. and Mrs. John Biek, was born in Dowagiac, August 1, 1891. He was educated in the public schools of the city and graduated from the High school with the class of 1909.

Entering the heating business at an early age, his history is the history of the Rudy Furnace company. Serving his apprenticeship in the furnace business with the Beckwith company, he joined with A. E. Rudolphi in 1915 to become one of the founders of the Rudy Furnace company. He helped build that organization and succeeded to its management upon the death of the founder three years ago. At his death he was vice president and general manager of the Rudy Furnace company, vice president of the Dowagiac National bank and vice president of the Rudy Acceptance corporation.

He was married to Wilma K. Judd on June 12, 1918, who, with two daughters, Mary Edwina and Charlotte Esther, aged 10 and 8 years respectively, survive him. He is also survived by his mother, Mrs. John Biek, and five sisters.

◆

New Company Succeeds Abram Cox Co.

Abram Cox Mfg. Corp. is the name of a new manufacturer of cast iron heating boilers, tank heaters and furnaces formed by Abram C. Mott, Jr., president and treasurer, Charles R. Minnick, vice president, and A. C. Mott, III, secretary, at Lansdale Pa. This new company has purchased all the patterns, equipment, patents, trade marks, etc., of the Abram Cox Co., Philadelphia, which concern has been liquidated.

◆

L. J. Mueller Moves Offices

The general offices of the L. J. Mueller Furnace Company, Milwaukee, Wis., maintained for 76 years at the same location at which the business was founded in 1857, will be moved on or about May 1 to newly built offices at the company's plant, at 2005 W. Oklahoma Ave., Milwaukee.

The removal of offices to the plant is being made in the interest of even more effective coordination between production and administrative departments, and in anticipation of an era of better business especially in the field of residence air conditioning.

◆

National Oil Burner Show

With plans for the oil burner industry's "Decade of Progress" moving rapidly into their final stages of completion, announcement has just been made by the American Oil Burner Association that the 10th National Oil Burner Show and Convention to be held at Hotel Stevens in Chicago, June 12-16, expects to attract 5,000 dealers from all over the country in time to arrive for Dealer's Day, June 14.

Instead of all business sessions the program this year calls for two "brass tack" sessions.

News Items . . . . . .

Columbus, Ohio, Firms Merge

Consolidation of the Munkel Heating Co. and the Lusch-McDonald Furnace Co., Columbus, Ohio, was announced May 1.

Two of the oldest heating firms in Columbus are merged in this move, both manufacturers of well known warm air heating and air conditioning products.

Simultaneously with the consolidation, which will be known as the Munkel-Lusch Co., was announced the removal to a new plant at Chambers road and the C. & O. railroad, on Olentangy boulevard. The plant was built for the handling of heavy furnace castings and parts, is located on a railroad and affords more room for a new department of the business, the jobbing of the "Lennox," "Lusch" and "Superior" lines of warm air furnaces.

In the new arrangement Charles A. Lusch will be president and treasurer, and Adolph E. Munkel will be vice president in charge of the sales and engineering work.

"Dolph" Munkel has been active in the furnace business in Columbus since 1903, while Mr. Lusch has been engaged in the same work locally since 1914.

The new organization will install furnaces, conditioned-air systems, and repair all makes of furnaces. It will also have a wholesale department for distribution of furnaces and fittings in Central Ohio. It will continue the sale of the Munkel gas attachment. The company will also continue the insulation of houses by the use of rock wool.

◆

R. J. Schwab Dies

R. J. Schwab, president and founder of the R. J. Schwab & Sons Co. of Milwaukee, Wis., died recently in Miami, Fla., in his 83rd year. The burial took place at Forest Home cemetery, Milwaukee. Three sons and five daughters survive him.

◆

Charles L. Fortier Dies

Charles L. Fortier, inventor of temperature regulators, died recently at his home in Milwaukee, Wis., after a short illness in his 80th year. He was for many years connected with the Johnson Service Co. of Milwaukee. He is survived by his wife.

◆

Acquire Motor Stoker Corp.

Motor Stoker Corporation, 290 Hudson street, New York City, manufacturers of automatic coal burning equipment, has recently been acquired by Walter Barnum and associates. Mr. Barnum was formerly president of the Pacific Coast Company, a holding and operating company of which Motor Stoker Corp. was a subsidiary.

◆

New Rudy Officers Named

Arthur F. Frazee was named Vice President and General Manager of the Rudy Furnace Co. by directors following the annual stockholders' meeting April 12. Formerly secretary and advertising manager, Mr. Frazee succeeds the late Charles J. Biek as general manager.

Leo J. Biek was made Secretary and Assistant Sales Manager, and Sidney B. Tremble, former newspaperman, Treasurer and Advertising Manager.

Stockholders elected Messrs. Biek and Tremble Directors to fill board vacancies caused by the deaths of Charles Biek and Eugene Gilbert, former Treasurer. Other Directors, including Mr. Frazee and Mrs. Arthur E. Rudolphi, President, were re-elected.

New Literature . . . .

New Edition of "Fan Engineering"

The Buffalo Forge Company, Buffalo, N. Y., has just issued a new edition of "Fan Engineering." Fully 100 pages have been added on the subjects of air, fans and fan applications. Many new types of air conditioning equipment are listed. Some 60 charts and tables illustrate the principles involved.

This book treats the subjects of air, heat and humidity at length and provides convenient tables and graphs for their study. It gives the fundamental principles of hygrometry and explains psychometric data and their formulae.

Several pages explain the pressure losses and frictional resistance in the flow of air through ducts, elbows and orifices. Others give methods for the distribution of air in heating, ventilation and exhaust systems. This volume goes into the subject of air conditioning in all its branches—heating, cooling, ventilation, humidification and dust control. It shows numerous tables on heat and infiltration losses and conductance factors. It takes up the subject of cooling with air, ice and refrigerants and shows the influence of sunshine and other heat sources. It stresses the need for sound control in fan design.

The book contains 622 pages. It is printed on good, thin India paper and is substantially bound in morocco Fabricoid, with rounded corners and gilt edges. The type is clean and easy to read. Copies may be obtained from Buffalo Forge Co., 490 Broadway, Buffalo, N. Y., at $3.00 each, postpaid.

◆

New Waterloo Register Catalogue

The Waterloo Register Co., Waterloo, Iowa, has had a revised catalogue printed and will be glad to supply furnace men with copies.

The new catalogue lists the company's many items. Each item is shown in an illustration. There are also complete tables giving sizes, finishes, and prices for each item. Among the items listed are the Standard, Novelaire, Art-Design, Wafer, Flush type Wafer, Diffuser registers; Ventilators; wood and steel cold air faces; floor registers; and miscellaneous items such as coal chutes, cast iron smoke pipe, fittings, etc.

◆

Toncan Iron Folder

A new folder, Properties of Toncan Iron, describing the properties of Toncan copper molybdenum iron has been prepared by the Republic Steel Corporation, Youngstown, Ohio.

The folder sets forth the properties and characteristics of this material, some of its applications, reactions under service and in working and other valuable information.

A copy will be mailed upon request.

◆

New Booklet on Monel

How a kitchen sink has opened a wide and rapidly expanding market for an industrial metal is told in a new book, "The Trend in Profits," just published by The International Nickel Company, Inc.

This book shows how Monel Metal, which five years ago was used almost exclusively for industrial purposes, is now serving a growing number of purposes in the home. It emphasizes the part played in this development by the introduction three years ago of a Monel Metal kitchen sink and lists the applications which have followed as a direct result, including cabinet sinks and tops, range tops, hot water boilers, washing machines, etc.

New Literature . . . .

Air Conditioning Pamphlets

A series of five small folders, under the general title "The Story of Air Conditioning" each taking up in detail a phase of the subject has been published by the Lakeside Co., Hermansville, Mich.

In order, these booklets discuss—What is Air Conditioning, Heating and Air Circulation, Economies of Air Conditioning, Humidity and Its Control, Three Years of Development.

Each booklet discusses its subject in language any prospect can understand and appreciate. The entire series has been written to definitely interest the buyer rather than the contractor. Little is said about technicalities, but the general subject of air conditioning is presented so that the buyer can visualize the possibilities and obtain a fairly good idea of the equipment required.

Every contractor selling conditioning should make the facts presented in these booklets the basis of his sales talks. Copies of the booklets will be mailed by the company to contractors who write for them.

◆

New Premier Handy Manual

The Premier Warm Air Heater Company of Dowagiac, Michigan, announces a new 1933 Handy Manual and Price List pricing the complete Premier Line, including air conditioners and blowers, at the lowest prices in the history of the Company.

A section of practical information is also contained in the new Handy Manual, providing the answers for practically all the hard-to-answer questions in connection with warm air heating and forced air work. The new Condensed Forced Air Code for this section will be found particularly helpful. A copy may be obtained by writing to Premier at Dowagiac.

◆

Allegheny Leaflets

Allegheny Steel Co., Brackenridge, Penna., will mail to contractors copies of a new series of leaflets describing the various types of Allegheny metal now manufactured.

These leaflets, seven in number, take up in detail each type of metal according to trade designation (as Allegheny 33). Each leaflet explains exactly what the material is, gives its characteristics, lists all shapes and sizes, devotes space to the material's reaction to active agents, presents the physical data, and explans the metal's application.

These leaflets furnish a complete guide to Allegheny metal and make a valuable source of information for the metal file.

The illustration herewith shows a stainless steel case filled with twenty-four bottles of the new beer which was made and sent to President Roosevelt.

◆

Comparative Data on Fuels

The Committee of Ten, Coal and Heating Industries, Bell Building, Chicago, has issued the sixth of the list of educational bulletins, this last one covering comparative data on solid, liquid and gaseous fuels. The bulletin consists of some 20 pages of information, tables, results of tests, etc., covering this subject.

For any contractor who wishes information on fuel tests for comparative calculations or selling, this bulletin which sells for 20 cents contains valuable information.

CLASSIFIED ADVERTISING

4 cents for each word including heading and address. Count seven words for keyed address. Minimum $1.00 for each insertion. One inch $3.00. Cash must accompany order. Copy should reach us eight days in advance of publication date.

BUSINESS CHANCES

LIGHTNING RODS

Dealers who are selling Lightning Protection will make money by writing to us for our latest Factory to Dealer Prices. We employ no salesmen and save you all overhead charges. Our Pure Copper Cable and Fixtures are endorsed by the National Board of Fire Underwriters and hundreds of dealers. Write today for samples and prices. Address L. K. Diddie Company, Marshfield, Wis.

SITUATIONS OPEN

WANTED: RELIABLE SALESMAN WITH car to sell new low priced furnace and boiler vacuum cleaner to heating trade. Splendid sales possibilities. Real profits. Straight commission. Side line or full time. Breuer Electric Mfg. Co., 865 Blackhawk St., Chicago, Ill.

WANTED SALESMAN: WE HAVE AN attractive commission proposition open for a salesman of proven ability, who will appreciate the opportunity in modern warm air heating and air conditioning field. Our line is one of the most attractive selling propositions in the field today, for aggressive salesman with engineering ability and sales energy. Include your complete experience and sales references with your application. Address Key 225, "American Artisan," 1900 Prairie Ave., Chicago, Ill.

SITUATIONS WANTED

WANTED: POSITION AS TINNER AND plumber. Have state license. An expert hot air furnace worker; also back bar and brewery work. Steady, sober, good habits. Good references. Address Key 229, "American Artisan," 1900 Prairie Ave., Chicago, Ill.

ALL AROUND SHEET METAL WORKER and heating expert and plumber, sober, steady and reliable, wants position. Will go anywhere and can do any job. Reasonable wages. Address Key 226, "American Artisan," 1900 Prairie Ave., Chicago, Ill.

WOULD LIKE TO CONNECT WITH someone who does blow pipe work around a glass house that manufactures bottles. I am an experienced man in that line and also the other sheet metal work and outside work. Will go anywhere. Address Key 227, "American Artisan," 1900 Prairie Ave., Chicago, Ill.

SITUATION WANTED: PLUMBER AND sheet metal man, with fifteen years' experience, now open for a steady place. What have you to offer? Address Key 228, "American Artisan," 1900 Prairie Ave., Chicago, Ill.

TINNER AND FURNACE MAN WANTS steady job, any place. I can lay out, figure and estimate. Cut own patterns and assemble same. Would like to hear from some reliable firm. Small town no objection. I can also do plumbing. Write for further details. Address J. R. Alexander, 1006 Coolbaugh St., Red Oak, Iowa.

SITUATION WANTED—ALL AROUND sheet metal worker and furnace man. Prefer Wisconsin, Michigan or Illinois. Available immediately. Address Key 167, "American Artisan," 1900 Prairie Avenue, Chicago, Ill.

SITUATION WANTED — BY AN ALL around sheet metal worker; one who can handle all branches of the trade as well as plumbing, steam and hot water heating. Have had 22 years' experience and can run shop, estimate and sell. Prefer connection with hardware store doing this line of work or one who is planning on it. Can furnish references as to character and ability. Address Key 218, "American Artisan," 1900 Prairie Ave., Chicago, Illinois.

FOR SALE

RECEIVERS LIQUIDATION SALE

Warm air furnace factory and equipment. Established line. Tinshop and equipment. Gray iron foundry, capacity 300 tons per month; well equipped. Railroad spur track. Jno. T. Hicks, Receiver, 4525 N. Euclid Ave., St. Louis, Mo.

PARTNERS WANTED

CORRESPONDENCE INVITED BY OWNers who are contemplating retiring in a few years and who would like to sell out or take a partner at that time. I am interested in sheet metal, plumbing, heating, combined or separately. Address Key 224, "American Artisan," 1900 Prairie Ave., Chicago, Ill.

WANTED TO BUY

WANTED TO HEAR FROM SOMEONE who has 4-foot used cornice brake for sale. Write to J. D. Jacimore, Russellville, Ark.

WANTED TO BUY: ONE USED FURnace cleaner. State make and price. Address M. J. Tomsho, 120 E. Broad St., West Hazleton, Pa.

WANTED: A SECOND-HAND VACUUM cleaner of the portable type. Must be in good working condition. Also a setting-down machine, hand type, second-hand. A. R. Harris, 4548 Hohman Ave., Hammond, Ind.

WANTED TO TRADE—A NEW BAKER Furnace Cleaner and complete equipment for a Maplewood Elbow Machine. Address Key 223, "American Artisan," 1900 Prairie Ave., Chicago, Ill.

MISCELLANEOUS

SOOT-SCAMP

cleans out furnaces and boilers. Made for coal and oil soot. Send 20c stamps for sample of each (value 85c). Simplex Control Co., 500 N. Prior Ave., St. Paul, Minn.

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For furnace damper regulators, thermostats, furnace clocks, skylights and ventilators. Put up 250, 500 or 1,000 feet to the reel, or in boxes to desired length. Furnished, if desired, coppered, sheradized or hot galvanized to prevent rusting.

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THE JOHN M. RUSSELL MFG. COMPANY, INC.
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Single Jack Chain


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FILTAIRE

Style A, a gravity filter for warm air pipes. Styles B and C for cold air returns and shoes. Style D and specials for forced air systems.

FILTAIRE solves your air cleaning problems.


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FILTAIRE CORP.
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Index to Advertisers

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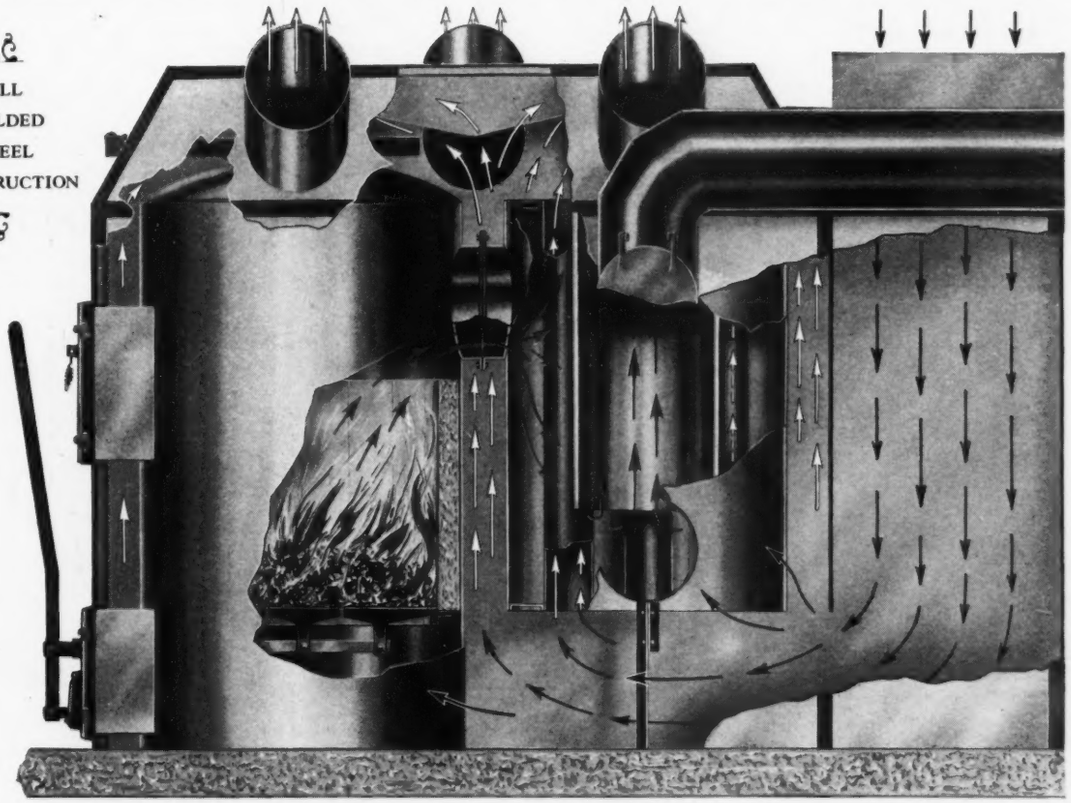
May, 1933

For Complete Lists of Furnace, Sheet Metal and Air Conditioning Products and Sources of Supply Consult AMERICAN ARTISAN ANNUAL DIRECTORY NUMBER

The BRUNETT "DUAL"
WARM AIR HEATING SYSTEM
A Great Fuel Saver Because of Its 2 in 1 Feature

ALL WELDED STEEL CONSTRUCTION



THE ONLY FURNACE MADE WITH A PATENTED BRUNETT HEAT UTILIZER

HERE'S an opportunity to increase your heating business 40% or more, due to the fact that the Brunett "Dual" Warm Air Heating System is easily sold, either as a Complete Unit, or the Heat Utilizer separately, which is built to fit any Hot Water or Steam Boiler, as well as any other Warm Air Furnaces. The Brunett "Dual" Warm Air Heating System opens up the field for the Warm Air Heating Man, because he can sell the Utilizer and attach to any Heating System—saving owner 25 to 60% of fuel bill. Here are authentic figures, proving that the Brunett "Dual" Warm Air Heating System produces heat with 91.707% efficiency:

UNIVERSITY OF MINNESOTA
College of Engineering and Architecture
MINNEAPOLIS

March 28, 1928

Dept. of Mechanical Engineering

An interpretation of the results of the test made on your Warm Air Heating System, shows the following sources of heat loss:

1. Heat loss to chimney	5.8%
2. Heat loss due to incomplete combustion	.37%
3. Heat loss in unburned carbon in ash	2.123%
TOTAL	8.293%

This leaves 91.707% of the heat available and can be taken as the efficiency of your plant, as operated under the test condition. I appreciate the splendid co-operation that you have shown in running the test.

Yours very truly,
John V. Martenis, Mechanical Engineer

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BROWN SHEET IRON & STEEL COMPANY

» *Pioneer Welders of the Northwest* «

BUILDERS OF THE WORLD'S LARGEST ONE UNIT WARM AIR FURNACES

964 BERRY AVENUE **SAINT PAUL, MINNESOTA**

MILCOR SHEET METAL PRODUCTS ARE THE STANDARD OF THE WORLD

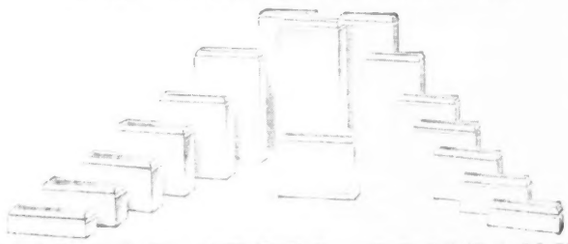
This TEE-JOINT will Outclass, Outsell ALL Others on the Market!

Never before have you seen a TEE-JOINT like this! Its frictionless construction permits an equal draft in each pipe. No current of air will flow properly around a right angle corner. This TEE-JOINT eliminates right angle corners entirely.

The New KUEHN'S FRICTIONLESS TEE JOINT is so far ahead of the old square corner type that there is absolutely no comparison. Everyone who sees it will want it. Its advantages are so obvious that IT SELLS ITSELF. The sooner you get your stock of these new TEE JOINTS, the sooner you can start turning them over at a real profit.

ORDER YOUR INITIAL SUPPLY RIGHT NOW

Poor fittings eat up profits. Insist on Milcor Quality always. Your Jobber will Serve You.



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